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Results Obtained in an Extensive Tuberculosis Case Finding Program in a Large City*

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THE elimination of tuberculosis is dependent upon the detection, isolation, and proper treatment of every case of tuberculosis before it has reached an advanced stage. To assist in the early detection of cases, the Department of Health of Detroit inaugurated a plan of Tuberculosis Case Finding in December, 1936, involving the medical participation principle.

The essential features of this plan, described in detail elsewhere,[1-4] were the following:

1. The necessary examinations were to be made by the private physician in his office.
2. The city was to pay for the examination of those who could not afford to pay.
3. Reports of all examinations made under the plan were to be submitted to the Department of Health.

For administrative purposes the city was divided into two parts: one known as the Special District comprised those sections of the city in which the incidence of tuberculosis was known to be excessively high, as compared with the city as a whole. In this district it was desired that everyone should be examined. With this end in view nurses made a house-to-house canvass to give information about tuberculosis, and to urge everyone to go to his family physician for examination. Physicians were urged to examine their entire clientele living in this district for tuberculosis. The rest of the city comprised the other part. In this district physicians were only supposed to examine known contacts to cases, and individuals whom they might suspect of having tuberculosis. It is thus evident that it was intended that there should be a difference between the two districts as to the number and class of persons to be examined; in one, everyone, and in the other, only contacts or suspects were to be examined.

This study deals with the results ob-

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tained during the first 18 months of the operation of the Medical Participation Plan adopted for finding cases of tuberculosis. The figures submitted are based upon preliminary tabulations of reports as they were received from week to week, a condition which did not permit extensive cross-checking for errors and duplications. This method of summarizing the data did not make it possible to be sure that the different groups which one might desire to compare would always include the same persons. Furthermore, it follows from this limitation that the same people may not have been included in the numerators and denominators of the various ratios that would naturally be employed. It is hoped that a complete statistical analysis will be made later by means of punch-cards and mechanical tabulation.

It should be understood that the figures in the tables that follow refer to tuberculin tests and X-ray examinations respectively, and not to individuals. For some individuals duplication of work is included in the figures. In the main, the vonPirquet method of tuberculin testing was used by the private physician, although the Mantoux test was also used to some extent.

GENERAL RESULTS

The general results are presented in Table I. It will be noted that during the 18 month period 114,831 tuberculin tests were reported, and of these, 31,803, or 27.8 per cent, were positive. The results of 27,084 X-ray examinations were reported. These were done by 26 specialists in roentgenology and 38 general practitioners who did their own X-ray work. The doing of these tuberculin tests and X-ray examinations resulted in the discovery of 633 verified cases of active tuberculosis. Approximately 2 per cent of the persons having positive tuberculin tests were found to have active tuberculosis. It may well be emphasized that the 2 per cent only included those cases of tuberculosis of such a degree of activity as to call for treatment.

The percentage of tuberculin tests reported to be positive increased from 24.2 per cent for the first period to 30.5 per cent for the last period. In the absence of any marked change in the age distribution of those tested from period to period this increase probably was due to an improvement in the accuracy with which the tuberculin tests were done by the participating physicians. This might well be expected in view of the

TABLE I

Tuberculosis Case Finding, Detroit

Distribution of Tuberculin Tests and X-ray Examinations According to the Period During Which They Were Done and Result

December 3, 1936, to July 1, 1938

Six Month Period	*Tuberculin Tests Reported*				*X-ray Examinations Reported*		
	Total	*Positive*	*Negative*	*Per cent Positive*	*Total*	*Per cent of Positive Tuberculin Tests*	*Verified Cases Found*
First	41,434	10,010	31,424	24.2	7,403	74.0	213
Second	33,295	9,565	23,730	28.7	8,757	91.2	204
Third	40,102	12,228	27,874	30.5	10,924	89.3	216
Total	114,831	31,803	83,028	27.8	27,084	85.2	633

Cases per 1,000 Tuberculin Tests	5.51
Cases per 1,000 Positive Tuberculin Tests	19.90
Cases per 1,000 X-ray Examinations	23.37

TABLE II

Tuberculosis Case Finding, Detroit

Distribution of Tuberculin Tests as Classified by the Reporting Physicians

April 16, 1937, to July 1, 1938

	Tuberculin Tests Reported			
Class	*Total*	*Positive*	*Negative*	*Per cent Positive*
Contact	7,299	2,986	4,313	40.9
Suspect	26,858	8,716	18,142	32.5
Unclassified	65,257	17,306	47,951	26.5
Total	99,414	29,008	70,406	29.2

fact that the tests were done by 705 different physicians. With the passage of time the percentage of people having a positive tuberculin test and not going for an X-ray examination, has diminished. For the entire period under consideration approximately 15 per cent of those having a positive tuberculin test did not have an X-ray examination. If we relate the verified cases to the number of X-ray examinations, which approximates the number of persons who had both a positive tuberculin test and an X-ray made, then 2.3 per cent of the positive tuberculin reactors were found to have active tuberculosis.

The doctors were asked to classify those on whom they did tuberculin tests as to whether or not they were contacts, suspects, or in neither of these classes. Table II indicates that the percentage of positive tuberculin reactors, as would be expected, was highest among the contacts. Next follows the suspects, and finally the unclassified group had the lowest percentage of positive reactors. This relationship was found to be true whether one were dealing with the persons living in the Special District, or living outside the Special District.

AGE

Beginning April 16, 1937, the tuberculin tests were classified according to the age of the persons to whom they related. The results are presented in Table III, and it is evident—as would be expected—that the percentage of

TABLE III

Tuberculosis Case Finding, Detroit

Distribution of Tuberculin Tests and Cases According to Age of Individuals Tested

April 16, 1937, to July 1, 1938

	Tuberculin Tests Reported				*Cases per 1,000 Tuberculin Tests*	*Cases per 1,000 Positive Tuberculin Tests*
Age	*Total*	*Positive*	*Per cent Positive*	*Cases*		
0– 9 Years	20,585	1,216	5.9	25	1.21	20.56
10–19 "	22,441	4,174	18.9	90	4.01	21.56
20–29 "	21,304	8,102	38.0	162	7.60	20.00
30 Years and Over	34,862	15,449	44.3	262	7.52	16.96
Age Not Stated	222	67	30.2	2	9.01	29.85
Total	99,414	29,008	29.2	541	5.44	18.65

TABLE IV

Tuberculosis Case Finding, Detroit

Relationship Between Age and Diagnosis for All New Cases

December 3, 1936, to July 1, 1938

	Diagnosis						
Age	*Childhood Active*	*Minimal*	*Moderately Advanced*	*Far Advanced*	*Pleurisy with Effusion and Other Forms*	*Total*	*Adult Types Per cent Minimal*
0– 9 Years	29	4	1	0	0	34	80.0
10–19 "	13	29	31	18	8	99	37.2
20–29 "	4	58	77	48	13	200	31.7
30 Years and Over	3	69	121	86	18	297	25.0
Age Not Stated	..	3	...	..	..	3	100.0
Total	49	163	230	152	39	633	29.9

positive tuberculin tests increased with the age of the persons tested. It is also evident that approximately 2 per cent of the positive tuberculin tests, regardless of age, were found to be associated with active tuberculosis in those to whom they related.

For the first 6 months of 1938 a larger number of age groups was employed in making the tabulations. The results corresponded in a general way with those of Table III. At age 50 and over, about 50 per cent of the persons tested were positive.

Table IV presents the relationship between age and the verified diagnosis for all new cases discovered under the Medical Participation program during the 18 months of its operation. It should be noted particularly that, if only adult types of active tuberculosis be considered, then 29.9 per cent were discovered in the minimal stage; also, that the percentage of minimal cases found decreased with increasing age. Cases were not considered to be in a minimal stage unless they were definitely active and needed treatment. If all minimal cases had been included irrespective of activity, then 53.4 per cent rather than 29.9 per cent were discovered in the minimal stage. It is well understood that the percentage of minimal cases found in different communities depends upon varying interpretations of what a minimal case is, so that the results obtained in different places may not be comparable.

TABLE V

Tuberculosis Case Finding, Detroit

Relation of Tuberculin Tests to Cases Found According to Area of Residence

April 16, 1937, to December 29, 1937

	Tuberculin Tests					
Area of Residence	*Total*	*Positive*	*Per cent Positive*	*Cases*	*Cases per 1,000 Total Tests*	*Cases per 1,000 Positive Tests*
Special District	48,472	13,148	27.1	238	4.91	18.10
Outside Special District	10,840	3,632	33.5	87	8.03	23.95
Total	59,312	16,780	28.3	325	5.48	19.37

RESIDENCE

In accordance with the administrative procedure outlined at the beginning of the paper, it was possible to classify the tuberculin tests and cases according to two areas of residence, namely, the Special District and the rest of the city. The result of this classification is presented in Table V. It will be noted that, of the tuberculin tests done on those residing in the Special District, 27.1 per cent were positive as compared with 33.5 per cent for those living outside the Special District. In view of the fact that everyone was to be tested in the Special District, and that only contacts and suspects were to be tested among those living outside the Special District, the result would seem to be what might have been expected.

It is also evident that, regardless of the area of residence, approximately 2 per cent of the positive tuberculin tests related to people who were found to have active tuberculosis. It is known that a number of those who had a positive tuberculin test did not have an X-ray examination, and therefore this percentage is somewhat too low. If the ratio between cases and tuberculin tests be based on total tuberculin tests rather than on positive tests, then those living inside the Special District had a smaller number of cases per 1,000 tested than was true of persons living outside the Special District. This, however, would be expected because, of those persons living outside the Special District a larger percentage was positive, and therefore the number of cases found per total number examined would naturally be larger.

For Table VI the distribution of tuberculin tests according to the residence of the persons concerned has been based upon census areas. In a rough way Census Areas A, B, C, K, and L correspond to the Special District in Table V. If Table VI be compared with Table V, it will be noted that the percentage of tuberculin tests that were positive for people living in the Special District, as compared with those living in the rest of the city is approximately the same; also that the cases per 1,000 total tests and cases per 1,000 positive tests, are higher for persons living in the Special District than for those living in the rest of the city. This is the reverse of what was found for the period covered by Table V. These differences call for comment, and the following explanations may be advanced for the evident contradiction.

1. There is a possibility that the efficiency of the tuberculin testing done on persons living in the Special District may have improved more with the passage of time than was the case with the testing done on those not living in the Special District.

2. The restriction placed upon physicians, that only contacts and suspects were to be tuberculin tested, may not have been rigidly adhered to. That this may have been the case is supported by the fact that for the first period covered by Table V, approxi-

TABLE VI

Tuberculosis Case Finding, Detroit

Relation of Tuberculin Tests to Cases Found According to Area of Residence

January 1, 1938, to July 1, 1938

Census Areas of Residence	*Tuberculin Tests*				*Cases per 1,000 Total Tests*	*Cases per 1,000 Positive Tests*
	Total	*Positive*	*Per cent Positive*	*Cases*		
A, B, C, K, & L	27,910	8,392	30.1	167	5.98	19.90
All Other Areas	12,192	3,836	31.5	49	4.02	12.77
Total	40,102	12,228	30.5	216	5.39	17.66

mately 82 per cent of the tuberculin tests related to persons residing in the Special District; while for the period covered by Table VI, only 70 per cent of the people having tuberculin tests resided in the Special District.

It does not seem to be epidemiologically sound to compare the results obtained in testing people residing in the Special District with the results obtained for those residing in the rest of the city. The differences obtained are probably due to differences in the way the people were selected for examination, rather than to any difference in the incidence of tuberculous infection as judged by the tuberculin test. The differences observed may be due to such factors as the following:

1. That in the Special District everyone was supposed to be examined, while in the rest of the city only contacts and suspects were expected to be examined.
2. It is conceivable that the doctors in one district may have had greater efficiency in carrying out and reading the tuberculin tests done.
3. There is a possibility that there was a difference in the age distribution of the people residing in the two districts respectively.

For the first 6 months of 1938 a distribution was made of the tuberculin tests done on children falling in the age group, 0–4 years, inclusive, according to the census area of residence of the children concerned. This, of course, removes the age variable when different sections of the city are compared, but does not eliminate factors 1 and 2 listed above. The results of this distribution are presented in Table VII. It should be noted that the percentage of positive tuberculin tests for children living in Census Areas A, B, C, K, and L, respectively, varied comparatively little. In other words, there seems to be very little evidence that for children there was any difference in the percentage of those exhibiting a positive tuberculin reaction when subdivisons of the Special District were compared. A special

TABLE VII

Tuberculosis Case Finding, Detroit

Distribution of Tuberculin Tests and X-ray Examinations According to Census Area of Residence

Age 0–4 Years

January 1, 1938, to July 1, 1938

Census Area	*Number of Tuberculin Tests*			*Per cent Positive*
	Total	*Positive*	*Negative*	
A	594	29	565	4.9
B	67	3	64	4.5
C	163	11	152	6.7
D	465	7	458	1.5
E	25	3	22	12.0
F	35	0	35	0.0
G	22	0	22	0.0
H	8	1	7	12.5
I	18	0	18	0.0
J	1	0	1	0.0
K	950	42	908	4.4
L	591	25	566	4.2
M	163	5	158	3.1
N	58	5	53	8.6
O	21	1	20	4.8
P	208	7	201	3.4
Total	3,389	139	3,250	4.1

study of certain subdivisions of the Special District also showed that this result held when persons of all ages were considered. This is what would naturally be expected as Census Areas A, B, C, K, and L are located in the section of Detroit where the environmental and economic conditions are the poorest.

If the percentages of positive tuberculin tests of children, presented in Table VII, for the other census areas be compared, it should be remembered that the differences may depend upon the method of sampling, or size of sample, rather than upon any actual difference between the various census areas in the incidence of infection as judged by the tuberculin test.

If the Special District be compared with the rest of the city, it is found that 4.7 per cent of the children living in the former area, as compared with 2.8 per cent in the latter, were tuberculin positive. This is perhaps tentative evidence that a greater percentage of children living in the poorer section of Detroit are infected with *Mycobacterium tuberculosis* than is the case among those living in the better sections of the city.

SUMMARY

The result of the first 18 months' activities in finding cases of tuberculosis under the Medical Participation Plan may be summarized as follows:

1. 114,831 tuberculin tests were reported by 705 individual physicians. Of these tests, 27.8 per cent were considered to be positive.

2. 27,084 X-ray examinations were reported by 64 physicians.

3. These tests and examinations resulted in the finding of 633 verified cases of active tuberculosis.

4. Approximately 2 per cent of the positive tuberculin tests related to persons found to have active tuberculosis, and this percentage in a general way was independent of age and residence.

5. Of tuberculin tests stated by the doctors to relate to contacts, 40.9 per cent were positive. Of those relating to suspects, 32.5 per cent were positive, and of those not related to either of these classes, 26.5 per cent were positive.

6. The percentage of positive tests was definitely associated with the age of the persons to whom they related. The percentage of positive tests increased with age, reaching a maximum of 50 per cent at about age 50.

7. Of the cases of adult type of active tuberculosis discovered, 29.9 per cent were in in a minimal stage as defined.

8. If adult type of active tuberculosis be considered, the percentage of minimal cases found declined with increasing age.

9. Because of the sampling restrictions imposed, a comparison of the results obtained for persons living in the poor section of the city—that is, the one where a high incidence of tuberculosis existed—with the results obtained for persons living in the rest of the city, was unsatisfactory. The two sections are really not comparable. Some evidence was obtained which indicates that within the poor district there was no marked difference from one subdivision to another in the incidence of tuberculosis as judged by the tuberculin test.

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Production of Mottled Enamel Halted by a Change in Common Water Supply*

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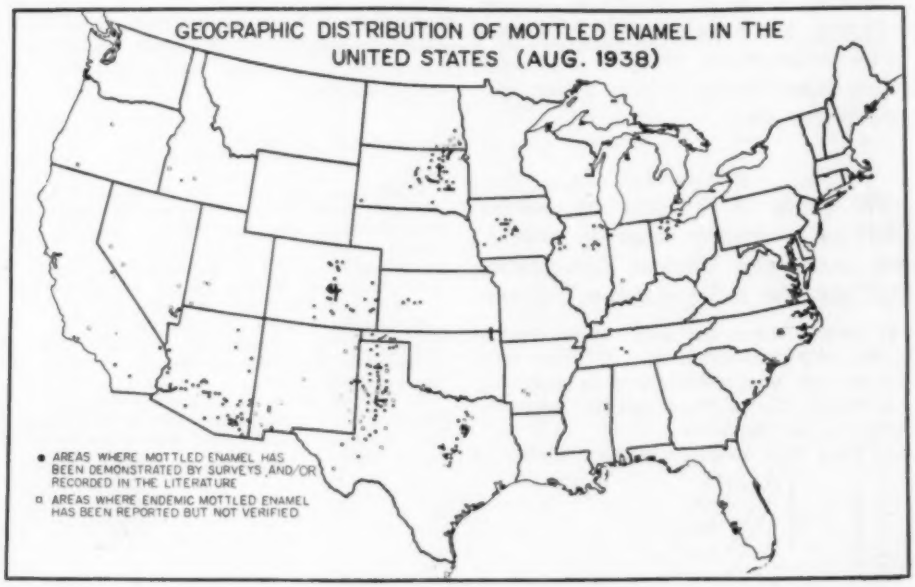
IN the United States at present there are about 375 known areas, divided among 26 states where mottled enamel of varying degrees of severity is found. This large number of areas made available for study various communities whose common water supplies contained fluorides in different concentrations. This, in turn, permitted detailed quantitative study of concomitant variations.

FIGURE I


GEOGRAPHIC DISTRIBUTION OF MOTTLED ENAMEL IN THE UNITED STATES (AUG. 1938)
• AREAS WHERE MOTTLED ENAMEL HAS BEEN DEMONSTRATED BY SURVEYS AND/OR RECORDED IN THE LITERATURE
o AREAS WHERE ENDEMIC MOTTLED ENAMEL HAS BEEN REPORTED BUT NOT VERIFIED

A recent report [1] summarized studies on the quantitative relation between the fluoride concentration of the common

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

TABLE I

Illustration of Quantitative Relation Between the Fluoride (F) Concentration of the Common Water Supply and Severity of Clinical Affection

City and State	Number of Children Examined	Mean Annual Fluoride (F) Content in p.p.m.	Percentage Incidence of Affection	Percentage Distribution of Clinical Severity: Pathognomonic Signs: Absent: Normal	Absent: Quest.	Present: Very Mild	Present: Mild	Present: Moderate	Present: Severe	Age Group or School Grade Examined
Pueblo, Colo.	83	0.6	2.4	88.0	9.6	2.4	...	...	...	9 Year
Jct. City, Kans.	115	0.7	1.7	95.7	2.6	1.7	...	...	...	9–10–11 yrs.
Big Spring, Tex.	68	0.7	3.0	85.3	11.7	3.0	...	...	...	5th, 6th Gr.
Mullins, S. C.	47	0.9	10.6	68.1	21.3	8.5	2.1	...	...	9–10–11 yrs.
East Moline, Ill.	110	1.5*	24.5	55.5	20.0	18.2	5.4	0.9	...	"
Webster City, Iowa	72	1.6	26.4	65.3	8.3	22.2	4.2	...	...	"
Monmouth, Ill.	38	1.7	42.1	36.8	21.0	36.8	5.3	...	...	9 Year
Galesburg, Ill.	57	1.8	35.1	45.6	19.3	26.3	5.3	3.5	...	"
Clovis, N. M.	138	2.2	71.0	13.0	16.0	23.9	35.4	11.0	0.7	9–10–11 yrs.
Colo. Spr., Colo	148	2.5	67.6	18.2	14.2	28.4	21.6	14.2	3.4	9 Year
Plainview, Tex.	77	2.9	87.0	3.9	9.1	33.7	24.7	24.7	3.9	9–10–11 yrs.
Amarillo, Tex.	229	3.9†	89.5	3.5	7.0	16.6	24.9	34.5	13.5	"
Conway, S. C.	59	4.0	88.2	5.1	6.7	20.4	32.2	23.7	11.9	"
Lubbock, Tex.	168	4.4	97.5	1.2	1.2	10.7	24.4	44.0	18.5	"
Post, Tex.	38	5.7	100.0	...	...	....	10.5	50.0	39.5	4, 5, 6 Gr.
Ankeny, Iowa	21	8.0‡	100.0	...	...	....	9.5	47.6	42.8	2–12 Gr.

* Subject to possible correction to 1.3 p.p.m.
† Subject to possible correction to 4.2 p.p.m. during susceptible period of the age group examined.
‡ Single determination, all others, arithmetical mean of 12 consecutive monthly samples.

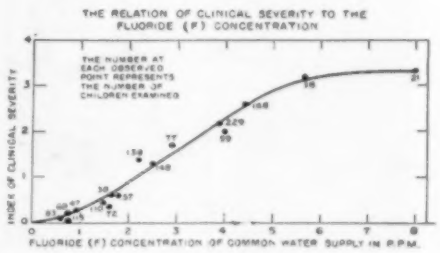
(Computed largely from data recorded in *Public Health Reports*, 52:1249–1264 (Sept. 10), 1937, and *American Journal of Public Health*, June, 1936.)

water supply and the clinical effect. Quantitative increase in the fluoride concentration of the domestic water was concurrent with an increase in the amount and degree of clinical severity. The direct verification of concomitant variation is shown in Table I. In order to present these tabular data graphically, a numerical index of clinical severity was computed by giving a definite weight to each of the several degrees of clinical affection. The following weights were given to each diagnosis: Normal, 0; Questionable, 0.5; Very Mild, 1; Mild, 2; Moderate, 3; and Severe, 4. The weighted index of clinical severity was then plotted against the fluoride concentration of the communal water supply. Figure II shows a rather precise quantitative correlation.

CONSEQUENCE OF CHANGE IN THE COMMON WATER SUPPLY

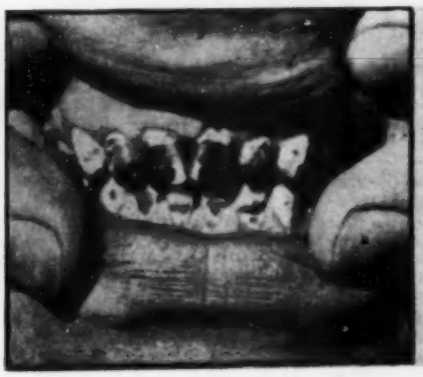
A more cogent type of epidemiological evidence is now added to that shown by concomitant variations. Three communities where the endemicity of mottled enamel had been confirmed by survey, changed their communal water supply from one containing a fluoride concentration now known to be sufficient to produce endemic mottled enamel to one practically free of fluorides. Each community presented the indispensable conditions of a susceptible population * using the "new" water supply and a sufficient lapse in time (8–10 years) for a study of the consequent

FIGURE II

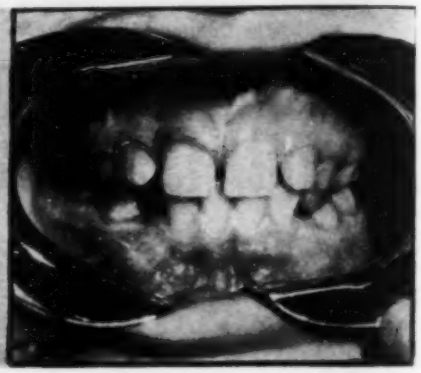

THE RELATION OF CLINICAL SEVERITY TO THE FLUORIDE (F) CONCENTRATION
THE NUMBER AT EACH OBSERVED POINT REPRESENTS THE NUMBER OF CHILDREN EXAMINED
INDEX OF CLINICAL SEVERITY
FLUORIDE (F) CONCENTRATION OF COMMON WATER SUPPLY IN P.P.M.

* Children in whom the crowns of their permanent teeth were calcifying.

CHILDREN WHO CALCIFIED THEIR PERMANENT TEETH WHILE USING:

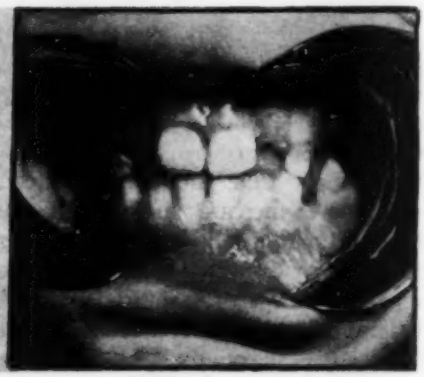


"Old" Bauxite Water
Mottled Enamel: Severe

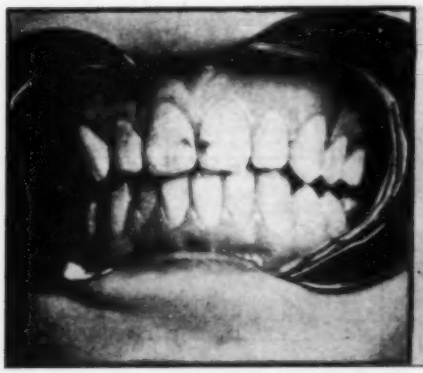


"New" Bauxite Water
Normal

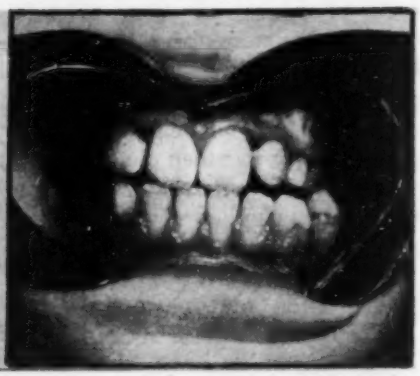
"Old" Oakley Water
Mottled Enamel: Moderate



"New" Bauxite Water
Normal



"Old" Oakley Water
Mottled Enamel: Mild



"New" Oakley Water
Normal

differences. The two sets of circumstances were similar in all respects save for the one difference, the change in the water supply. The surveys made prior to the change in the water supply and the resurvey made after the requisite lapse of time were made by either one or the other of the writers. The communities studied were: Oakley, Ida., Bauxite, Ark., and Andover, S. D.

Oakley, Ida.—The first instance of a community changing its public water supply solely for the purpose of preventing mottled enamel is that of Oakley, Ida. A survey of this community was made by one of us [2] in February, 1925. Seventy-eight children whose histories indicated continuous residence and uninterrupted use of the common water supply were examined. The incidence of affection was 100 per cent. The common water supply of Oakley at the time of the survey was obtained from a warm spring. Following the survey, the community on July 1, 1925, changed its water supply, the new supply being obtained from a nearby cold water spring. The selection of this water was based on the observation that the 4 children of a family using this spring were free of mottled enamel.

Approximately 7½ years (February, 1933) after the change in the common water supply, Oakley was resurveyed.[3] Twenty-four children born since the change in the water supply were examined. *All showed normal calcification* in those permanent teeth which at that time had erupted. According to analyses[3] made by Churchill, the "old" Oakley water contained 6.0 p. p. m. of fluorine; the "new" supply, less than 0.5 p. p. m.

Bauxite, Ark.—In February, 1928, a mottled enamel survey of Bauxite was made by Kempf and McKay.[4] Sixty of the 62 children of continuous residence examined showed mottled enamel, generally of a severe type. Of the two classified as normal, Kempf and McKay recorded in a footnote that although the homes of these children were piped for the city water, it appears that it was only used occasionally for domestic purposes. The water used by the 60 affected children examined during the 1928 survey was obtained from deep wells and, according to Churchill,[5] contained 13.7 p. p. m. of fluoride (F).

In May, 1928, the Bauxite water supply was changed, the "new" supply being obtained from the nearby Saline River. A resurvey [6] by the writers in March, 1938, showed that of the 45 children born since the change in the water supply, only 2 showed even the mildest form of mottled enamel.* The "new" filtered river water supply is practically free of fluorides, containing less than that determinable routinely (0.2 p.p.m.).

Andover, S. D.—In 1916, one of us (F. S. McK.) made a qualitative survey of the school children of Andover and found mottled enamel endemic, associated with the use of the water from the city artesian well supply.[7] In 1928 this deep well water supply† failed and the community was forced to change from the 800′ artesian to a dug shallow well 22′ deep. An examination of the school children by one of the writers (H.T.D.) in April, 1938, showed that

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* A possible explanation of the two "very mild" cases is contained in the detailed report of the Bauxite resurvey (*Pub. Health Rep.*, 53:1736–1748 (Sept. 30), 1938). The fluoride (F) content of the "old" Bauxite water was so unusually high, 13.7 p.p.m., that the question of antepartum maternal fluorosis and subsequent transfer of small amounts of fluorides in the mother's milk cannot be excluded. The 7 year old child with the "very mild" diagnosis was nursed 15 months. Consideration might also be given to possible fluoride deposits from the "old" supply in the water pipes and cooking utensils.

† The fluoride content of the "old" Andover (S.D.) deep well water is not known, but presumptive evidence based on clinical mottled enamel among those who calcified their permanent teeth while using this water indicates that it contained fluorides, probably in the neighborhood of 2.5–3.0 p.p.m. of fluorine. Wells of comparable depth in the immediate rural district are likewise producing mottled enamel.

TABLE II

SUMMARY OF THE FINDINGS IN SURVEYS OF THREE COMMUNITIES WHERE THE PRODUCTION OF MOTTLED ENAMEL WAS HALTED BY A CHANGE IN THE COMMON WATER SUPPLY

FINDINGS OF ORIGINAL SURVEY															INCIDENCE OF MOTTLED ENAMEL AMONG USERS OF "OLD" WATER SUPPLY	FLUORIDE (F) CONTENT OF "OLD" WATER SUPPLY	INCIDENCE OF MOTTLED ENAMEL AMONG USERS OF "NEW" WATER SUPPLY	FLUORIDE (F) CONTENT OF "NEW" WATER SUPPLY
AGE OF CHILD AT TIME OF EXAMINATION		OVER 15	15	14	13	12	11	10	9	8	7	6						
OAKLEY, IDAHO FEB. 1925	WATER USED-CALCIFICATION PERIOD	WARM SPRING SUPPLY																
	NUMBER OF CHILDREN EXAMINED												78					
	% HAVING MOTTLED ENAMEL												100					
BAUXITE ARKANSAS FEB. 1928	WATER USED-CALCIFICATION PERIOD	DEEP WELL WATER																
	NUMBER OF CHILDREN EXAMINED	3	1	3	7	2	2	4	8	10	13	9						
	% HAVING MOTTLED ENAMEL	66	100	100	100	100	100	100	100	100	100	89						
													96 *					
ANDOVER SO. DAK. OCT. 1916	WATER USED-CALCIFICATION PERIOD	DEEP ARTESIAN WELL																
	NUMBER OF CHILDREN EXAMINED	NOT STATED																
	% HAVING MOTTLED ENAMEL	QUALITATIVE SURVEY ONLY																
		MEDIUM DEGREE OF ENDEMICITY																

FINDINGS OF RESURVEY															%	P.P.M.	%	P.P.M.
AGE OF CHILD AT TIME OF EXAMINATION		OVER 15	15	14	13	12	11	10	9	8	7	6						
OAKLEY IDAHO FEB. 1933	WATER USED-CALCIFICATION PERIOD	WARM SPR. SUPPLY						BOTH SUPPLIES			COLD SPR.				92	6.0	0	<0.5
	NUMBER OF CHILDREN EXAMINED	-	15		10	3		11	15	14	16	8						
	% HAVING MOTTLED ENAMEL	-	93		100	66		36	13	14	0	0						
			92					20			0							
BAUXITE ARKANSAS MAR. 1938	WATER USED-CALCIFICATION PERIOD		DEEP WELL		BOTH SUPPLIES			FILTERED RIVER WATER							100	13.7	4	0.
	NUMBER OF CHILDREN EXAMINED	-	7	7	10	6	7	5	13	8	14	5						
	% HAVING MOTTLED ENAMEL	-	100	100	80	50	14	0	8	0	7	0						
			100		52			4										
ANDOVER SO. DAK. APR. 1938	WATER USED-CALCIFICATION PERIOD	DEEP ARTESIAN WELL			BOTH SUPPLIES			SHALLOW DUG WELL							72	†	0	0
	NUMBER OF CHILDREN EXAMINED	6	5	2	2	5	1	6	2	0	6	0						
	% HAVING MOTTLED ENAMEL	83	60	50	50	40	0	0	0	-	0	-						
			69		37			0										

* IN THE TWO NORMAL CASES AUTHORS RECORD IN FOOT NOTE, DISCONTINUITIES IN USE OF COMMON WATER SUPPLY.

† ON THE BASIS OF CLINICAL EVIDENCE, ARTESIAN WELL SUPPLY PRESUMABLY CONTAINED ABOUT 2.5 TO 3.0 PARTS PER MILLION OF FLUORIDE (F).

the 14 children, 6–10 years of age, born since the change in the water supply, presented normal calcification of the permanent teeth. The "new" water supply used by these children was found to be free of toxic amounts of fluoride.

DISCUSSION

An analysis of the findings, by age groupings, of the resurveys recorded in Table II shows the striking differences resulting from the mere change in the water supply. Those in the higher age groups who calcified their permanent teeth while using the "old" water supply show an incidence of mottled enamel comparable to that observed during the original survey. Next a definite decrease in the percentage incidence of affection becomes manifest in those children whose dental calcification period overlapped the change in the water supply (age group who calcified their teeth while using both water supplies), and finally the relative freedom from mottled enamel in those born subsequent to the change in the water supply. These decreasing percentage incidences of clinical affection speak for themselves. With respect to Oakley, they were 92, 20, and 0; Bauxite, 100, 52, and 4; and Andover, 69, 37, and 0, respectively.

While we are fully aware that the number of observations is comparatively small, the effects noted are consistent. The observations, moreover, were limited to those children constantly exposed to the risk of the disease, namely, they were born in the community, had in general always resided there, and had always used the common water supply for both drinking and

cooking. In the case of the resurvey at Bauxite, the facts with respect to residence and water consumption were verified in each instance by an interview with the child's parent.

In specific water-borne diseases, the time intervening between the elimination of the antecedent cause and the nonappearance of the pathological entity is relatively short. The opposite characteristic of endemic dental fluorosis (mottled enamel) makes it unique among the water-borne diseases. An interval in time between 8 to 10 years is required to carry out a human experiment that furnishes clinical proof that the development of the disease has stopped.

With the report on the results obtained at Oakley, Ida., Bauxite, Ark., and Andover, S. D., showing that the production of mottled enamel has actually been stopped by the mere change in the water supply from one containing concentration of fluorides toxic to calcifying dental enamel to one practically free of fluoride (or less than 1.0 p.p.m.), the most conclusive and direct proof that fluoride in the drinking water is the primary cause of human mottled enamel has been presented. The separate steps in the complete chain of evidence may now be summarized as follows:

1. The evidence pointing to mottled enamel being a water borne disease.[8, 7]

2. The finding of fluorides in domestic waters associated with the production of mottled enamel.[9, 5, 10]

3. The experimental production of dental lesions in white rats and dogs by waters from endemic areas and waters to which fluoride has been added.[9, 11, 12]

4. Quantitative epidemiological studies on human mottled enamel correlating the fluoride concentration of the domestic water with the degrees of clinical severity.[13, 1]

5. And finally, after the lapse of the necessary interval of 8 to 10 years, the clinical evidence that the production of human mottled enamel had been halted by merely changing the common water supply from one containing fluorides in concentrations toxic to calcifying dental enamel to one practically free of fluorides.[3, 6]

SUMMARY

1. The production of the endemic hypoplasia of the permanent teeth known as mottled enamel has been halted at Oakley, Ida.; Bauxite, Ark.; and Andover, S. D., by simply changing the common water supply from one containing amounts of fluorides toxic to calcifying dental enamel to one whose fluoride content does not exceed the permissible maximum, 1 p.p.m.

2. Oakley, Ida., and Bauxite, Ark., are the first known instances of communities abandoning an otherwise satisfactory common water supply solely for the definite purpose of preventing mottled enamel; and in itself likewise represents the first instance where a common water supply was changed solely for the purpose of preventing a dental disease.

3. The unusually long interval in time (8–10 years) before the clinical effects resultant from a change in the water supply may be observed clinically, is unique in epidemiological investigations of water-borne diseases.

4. With the report on the results obtained in three endemic areas, showing that the production of mottled enamel has actually been stopped by the mere change in the water supply from one containing concentrations of fluoride toxic to calcifying dental enamel to one practically free of fluoride, the most conclusive and direct proof that fluoride in the domestic water is the primary cause of human mottled enamel, has been presented.

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Public Health Administration

IT is indeed the practitioners of medicine, and chiefly the general practitioners, who by their observations at the bedside have pointed out the way to preserve health and have proclaimed the need for public health administration in season and out of season with a most laudable persistence. Nay, more, the comprehensive character of public health legislation and administration, as we see it today, came into being through public remonstrances by the medical profession against the disorderly state of the early sanitary laws. —Health and The State, Walter Elliot, *Brit.M.J.* Feb. 25, 1939.

In-Service Training for Doctors and Nurses*

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ALTHOUGH the phrase "in-service training" is one of more recent origin, the principles underlying such efforts have been practised ever since human beings first learned to work together. One must first know exactly what the job is and why it is to be done. Next he must be taught which of the several methods of accomplishing the end is the best. He must then be put under a type of leadership which will allow him to do his job this way and which will foster desirable working relationships and attitudes.

These principles probably sound too simple but in the complexity of planning our programs we often neglect them. We assume that we know our objectives—mouthing the words we have written in our manuals. We use methods to accomplish our ends which we have not critically examined nor experimentally tested for effectiveness. We do not recognize that the attitude toward the job and the working relationships of our staff are often the chief stumbling blocks in the path of efficient service. Perhaps these errors in not thinking through our problems have led to the perfunctory performance which characterizes so much of our school health work.

The principles we have outlined are applicable both to the training of the employee who is just entering service and to the one who needs revitalizing in his job.

What is the job? Assuredly, not to find out how many correctable defects there are per child—not to build up the service so that the total number of nursing home visits shall be increased from year to year—but to serve Johnny Jones, the patient. "To serve the child" is, however, much too vague an objective—for this question, "What is my job?" must be answered in as direct terms as possible. For example, we may say that a part of the school nurse's job is to coöperate with the teacher in the follow-up work. But what in our given school situation is the exact way to do this? What will be the nurse's share in this job? The teacher's? Do they know each other's responsibilities? The answers to these questions must be specific. Does the teacher or the nurse have the better opportunity to procure proper dental care for the children in this school?

Our second principle—knowing how the job can best be done—demands that we know the problems involved. Still considering the rapport between nurse and teacher, let us suppose that we have decided that a regular conference between the two is a method we have selected to promote "follow-up" work. But we must discover what

* Based on a paper presented at the Joint Session of the American School Health Association and the Child Hygiene Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 27, 1938.

problems both the teacher and the nurse face in securing dental aid for Johnny, what information the nurse can give about the clinic facilities available, or what she found out when she visited in the home last week. What does the teacher learn from Johnny as she meets him daily in the classroom? Then, together they may propose a method of handling the problem, test it out, and finally arrive at a solution which will be applicable for all the children in this grade.

Today's solution may, however, not be tomorrow's. We must, particularly for employees long in service, substitute an interest in today's problems for blind adherence to yesterday's solutions. We must test out our procedures repeatedly and be ever on the alert when we inquire into how or why things are done for an inflexible reply, "That is the way we do it." This answer too often implies that the critical attitude is no longer in operation.

The third principle is to afford the employee a type of leadership which will allow him to do his specific job in the best way. I happen to believe in that democratic type of leadership which allows for group participation and group determination of objectives and methods. Some administrators argue that this method is more time consuming. It may be for the immediate present, but in a profession like public health with its complicated problems and its ever changing frontiers, the employee must meet many problems individually, he must adapt what he has to what is needed, and he must be able to follow new procedures from time to time. It, therefore, seems wiser to equip him with a thorough understanding of the philosophy of what we are trying to do, and to allow him to participate in planning the program. He will then feel it is his own and carry it out more efficiently than if he were merely ordered to proceed.

METHODS OF STAFF TRAINING

The Department of Health in New York City has for the past two years carried on an in-service training program in accord with these principles. It has been unusually fortunate in having a group devoting its attention during this time solely to problems of staff education.

Report of these activities is made now only by request, for so short an experimental period makes it impossible to evaluate results. However it does seem possible to offer a critique of the teaching methods which have been used. Inspiration for these remarks is drawn from three sources: the Astoria school health study,[1] a project in staff education for nurses,[2] and a general training program in the department.

Each training venture has begun with an analysis not only of what the job is but what the training and experience of the staff are. Thus in the school situation, personnel cards were first made out showing where each physician and nurse had received professional education and what experience each had had—not only in medicine and nursing but in teaching, writing, etc. We were then in a better position to judge what subject materials should be emphasized and at what level we could begin.

Ways of inaugurating such training programs and the difficulties which are encountered could be discussed at some length but it seems more pertinent to confine the discussion to the teaching methods which have been used. The training of employees long in service will be stressed, for with the exception of one experiment with an unusually large group of new nurses entering the department, our experience is based on the training of the permanent staff of part-time physicians and full-time nurses in school and child health services.

THE LARGE MEETING AND THE LECTURE

A widely used method of staff training is the large staff meeting at which some one or two pertinent topics are discussed, often in lecture form by an outside expert. Despite its limitations, which are well recognized by all authorities in the field on adult education, this method has been found useful. Our group of 175 school physicians, for example, had little pride in the specific profession of being a *school* doctor. We used vacation times to bring them together for "school health institutes"—21 half-day sessions with speakers on cardiac disease, child psychology, administrative problems, childhood tuberculosis, etc. The programs were determined partially by the suggestions the physicians sent in.

The morale and interest of the group improved markedly following these sessions. We were careful to choose distinguished speakers—but speakers who we knew had something practical to offer our group. No matter how distinguished the speaker, at least 30 minutes were spent to discuss with him in advance of the meeting the problems we faced. Often we found it valuable to stress how this point of view—applicable at another time, perhaps—might not meet today's needs in our department. For example, a very practical pediatrician who was asked to speak on endocrinological problems in school children, said he had long wished for an opportunity to urge school physicians to send children into clinics for early diagnosis of endocrinopathies. We told him our problems in having insufficient staff to get even a child with 20/100 vision to the oculist for the glasses that would enable her to see the blackboard, and our problem with the mother who took fat Johnny to the clinic, only to be told after a long series of elaborate tests, that he should eat less and come back in 9 months for a check-up. Could we get her to go to a clinic again when sister Mary was found to have a marked hearing loss? No, she had been there last year and nothing happened. Our specialist had never considered these problems.

After this preliminary conversation he came to us with an excellent presentation of the clinical aspects of endocrinological problems, emphasizing the ones which really should be taken to a consultant because therapy might be of benefit and the ones for which little could be done anyway so the child could as well be watched in school.

So the large meeting may be useful—to build morale, and sometimes to "put over" an idea the staff has been slow to accept until it came from someone they considered to be an authority. It should not be assumed, however, that the employee will often be stirred to action by a lecture or that his deeply ingrained habits will thereby be changed.

THE SMALL GROUP AND COMMITTEE

From the point of view of effective teaching the small conference group is usually more influential than the lecture. Here the group can attack problems directly, can organize itself, seek information from a variety of sources, and can work directly in the field. The problems are more practical ones—the solutions often more workable than those concocted in the administrator's office. The use of such employee groups is unlimited—and with wise leadership a source of constant inspiration to the officer responsible for the service as well as an excellent teaching device.

Such conferences are often of more value if all of those concerned in a given service are included. Many problems could not be solved until we had both the physician and nurse around the same conference table. Only then were we able to discover a real answer to the simple question of who should

do what in the school medical room. Another problem may demand that the teacher be at the conference. Ideas expressed at the small conference table can be tried out until we finally discover the best service which doctor, nurse, and teacher can give as a team.

Keeping careful records of these group meetings and circularizing the minutes increases the interest in them. We have even developed a mimeographed journal out of one such group. All of us need recognition and approval —and particularly in a job which tends to become a routine one. Assisting the school physician or nurse to find satisfaction in his or her work is a part of the training program—and the recognition which comes through the journal or report sent to the rest of the staff builds ego as well as being of some intrinsic value.

THE TRAINING CENTER

Another teaching device is the training center. By this we mean a typical unit of service which can be used for teaching the employee while he or she is actually "on the job." No more than the routine staff is assigned to care for the service in this center, and there is no additional equipment. One center now in use for instructing physicians and nurses of our well baby clinics has for example, a "floating" staff of doctor and nurse who are attached to the center to take the place of those who must leave their own work at a baby station to come to the center. The "student" physician and nurse are at present staying one month in the training center. They work here under supervision and guidance. There is plenty of time for discussion and analysis of problems and for frequent staff meetings. The doctor goes on ward rounds in an adjacent medical school pediatric department to refresh his knowledge of the diagnosis and treatment of sick children. Both nurse and physician visit and participate in special dental and child guidance clinics. Special technics in vision and hearing tests for preschool children may be taught those who will use them. A nutritionist conducts conferences on home relief budgets, costs of infant formulae, etc.

Many teaching devices are used. The doctor may be asked to check all the charts at the end of the clinic and choose which babies should be visited by the nurse. The nurse and doctor together make some of these visits—sometimes on cases which the doctor has written up—sometimes on cases which some other physician has recommended for a home visit. Various problems of special interest are studied. Suppose our doctor is interested in what dosage of cod liver oil seems to be effective in preventing rickets. Why not see what the charts show? It is his research problem, and his disappointment when he cannot find the data he needs in these poorly kept records may be translated into better record keeping.*

The "floating staff" and this student staff meet from time to time to discuss problems—perhaps ones the "floating" staff has found in the field station. Even the supervisors of the student staff are brought in, for everyone must know and understand the program. One pediatrician and one nurse constitute the full-time teaching staff assigned to the center. The educational staff for special topics is borrowed from many sources in the community, for we want our staff not only to learn department routines but to see how we can coöperate with other agencies. After one month the student staff goes back into its own station where an additional teaching physician is assigned to assist

* Improving the quality of the records kept is an important problem in our service. We have, therefore, tried as many devices as possible to stimulate an interest in and an understanding of the need of better records. All these above listed procedures are useful. For another experience of this kind, see reference 3.

with following through the instruction begun in the center and to direct any new ventures.

The training center acts also as an experimental laboratory in which to test new procedures. The experimental attitude stimulates a more critical point of view and through it we are often able to teach some of the points we have long wished to emphasize concerning the service itself.

We have had some experience in which only the physician came to the center—a center in which he did not participate actively in the program and in which the problem approach was not widely used. This was not successful and therefore we have developed this other type of training center.

We have not established a training center for school physicians and nurses. We do not feel that as yet we have reached a point where we are ready for an elaborate training program for this personnel. The school health study unit is analyzing the respective rôles of physician, nurse, and teacher in the complicated school situation in a few schools, but we are not as yet ready to superimpose the procedures used there on the other 600 schools in the city. For, as stated previously, we believe that we must have a fairly clear idea of what the job is before we start a training program.

THE PROBLEM APPROACH

In both the small group and the training center, we have emphasized the problem approach for we believe it to be a most valuable teaching device. It may also be applied to larger groups. We have, for example, about 150 school physicians who are hired on a 12 month basis but work in schools only 10, leaving some time free during the summer. This year we decided that sending school physicians out to visit in homes might emphasize the economic, hereditary, and social factors involved in nutrition. The group had had a few lectures on the subject. An outline was provided with the questions we hoped they would learn to ask in a case of this kind. Preliminary sessions outlined our objectives and attitudes and presented facts of current food costs, home relief allowances, etc. About 5,000 visits were made in the homes of children whom these doctors had previously diagnosed as "malnourished." They were asked to select from the group visited the children they thought would be benefitted by additional supervision in special health classes. We have not as yet been able to analyze the results of this program but our first reports indicate that the plan had value as a teaching device; and, moreover, it brought us suggestions for our program of health education. Almost twice as many families, in the doctor's opinion, were ignorant of foods and food values as were ignorant of the principles of family budgeting. Our first job, then, would appear to be to give these families a fundamental knowledge of nutrition before we teach them how to spend their available funds to buy these foods. So the problem approach acts not only as a teaching device for the staff but brings to light valuable "hunches" for future plans.

THE EXCHANGE SERVICE

Outside influences may be effectively brought into a staff training program. Does your doctor need additional pediatric training or would closer contact with the clinic to which he refers children benefit your service? Why not arrange for an exchange, in which the hospital resident has some field experience in your department's well baby clinics or schools and your doctor goes back to the hospital service again? Or, perhaps, your school physician would welcome some clinical sessions in your local hospital for contagious diseases? Or as he becomes more aware of the

child's personality, should he attend a child guidance clinic? We have used several of these schemes with some measure of success.

We have also tried on two occasions to send physicians to postgraduate medical schools for training courses but have found it difficult to select from a curriculum designed for the private practitioner courses which meet the needs of our physicians who are not concerned with therapeutics.

OTHER AIDS

There are many other tools which may be of assistance in the in-service training program. The envelope or package library with selected reprints, pamphlets, or small books on a given subject, is valuable, particularly, when the staff has helped select the materials. Building up a reference library for the staff to use is another teaching device and can lead as well to a wider use of the existing library facilities. Circularizing the announcements of open medical and nursing society meetings, adult education forums on pertinent topics, may be just the extra stimulus needed to get the mildly interested to attend.

CONCLUSION

In conclusion we wish to point out that pre-service training is one thing and that in-service training is another. The latter demands that the employee be taught what his job is, how it can best be done, and that he be afforded the type of leadership which allows him to do the job this way. Moreover, the in-service training program is often more concerned with changing attitudes than with teaching specific skills. It is, therefore, necessary to understand the philosophy underlying the service and to study the relationships of the specific job. This is not an easy task—and no one of the several technics which have been described does the trick. After all, the effective training program, as we understand it, is no sleight-of-hand performance, but an ever deepening understanding of what our jobs are, a process of growth which is never completed.

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Safe Operation of Degreasing Tanks Using Trichlorethylene*

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THE oil and grease films which form on the surfaces of metal objects during their manufacture must be removed before the parts can be successfully plated, enameled, or painted. Several methods of degreasing have been developed including washing in a suitable oil and grease solvent. This method is widely used at the present time, particularly for the degreasing of small metal parts, and the solvent commonly employed is trichlorethylene, a chlorinated hydrocarbon.

The utilization of trichlorethylene in degreasing depends principally on its solvent action on oils and greases. It has the advantage of being non-inflammable and non-explosive.

Trichlorethylene is a heavy, low-boiling, colorless liquid with an ethereal odor. The most important physical and chemical properties are shown in opposite list.

Trichlorethylene vapor is stable on heating † to temperatures up to 257° F. (125° C.) but continued heating above this temperature in the presence of oxygen causes decomposition with corrosive acid formation (HCl). To inhibit such decomposition it is customary for the commercial solvent to contain small quantities of anti-oxidants.[1] Such inhibitors also prevent photochemical decomposition due to light.

Although trichlorethylene is non-inflammable,† at high temperatures such as occur in gas flames, electric heaters, and burning tobacco, its vapors may

PHYSICAL AND CHEMICAL PROPERTIES OF TRICHLORETHYLENE

Formula	C_2HCl_3
Molecular wt.	131.4
Specific gravity 20°/4° C.	1.4649
Boiling Point (760 mm.)	188.6° F.
Freezing Point	—123.5° F.
Latent heat of vaporization, B.t.u./16/° F. ..	103.1
Specific Heat (liquid) B.t.u./16/° F.	0.223
Vapor Density (at B.P. and 760 mm.)	4.53 (referred to air = 1.00)
Solubility in water at 25° C. (gm./100 gm.)	0.17

* Read before the Industrial Hygiene Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

† Since the preparation of this manuscript, information has been obtained to indicate that trichlorethylene air mixtures are inflammable under certain conditions. Contact of the vapors with sources of ignition such as flames, sparks, and red hot metal should be carefully avoided.

decompose with the formation of corrosive and toxic substances such as hydrochloric acid and phosgene. To prevent inhalation of these, the combustion products from open flames must, therefore, be vented so as to be disseminated safely outside of the building, and smoking in the vicinity of equipment using trichlorethylene must be prohibited.

Trichlorethylene may also be decomposed on prolonged heating in the presence of finely powdered aluminum. This is due to the catalytic effect of aluminum chloride that is first formed. Because of this whenever there is aluminum dust or small chips on the parts to be cleaned, frothing may occur with accompanying bad odors, both indicative of decomposition. The addition of water to the trichlorethylene in the first wash tank as an extreme measure will prevent such decomposition when cleaning aluminum parts.

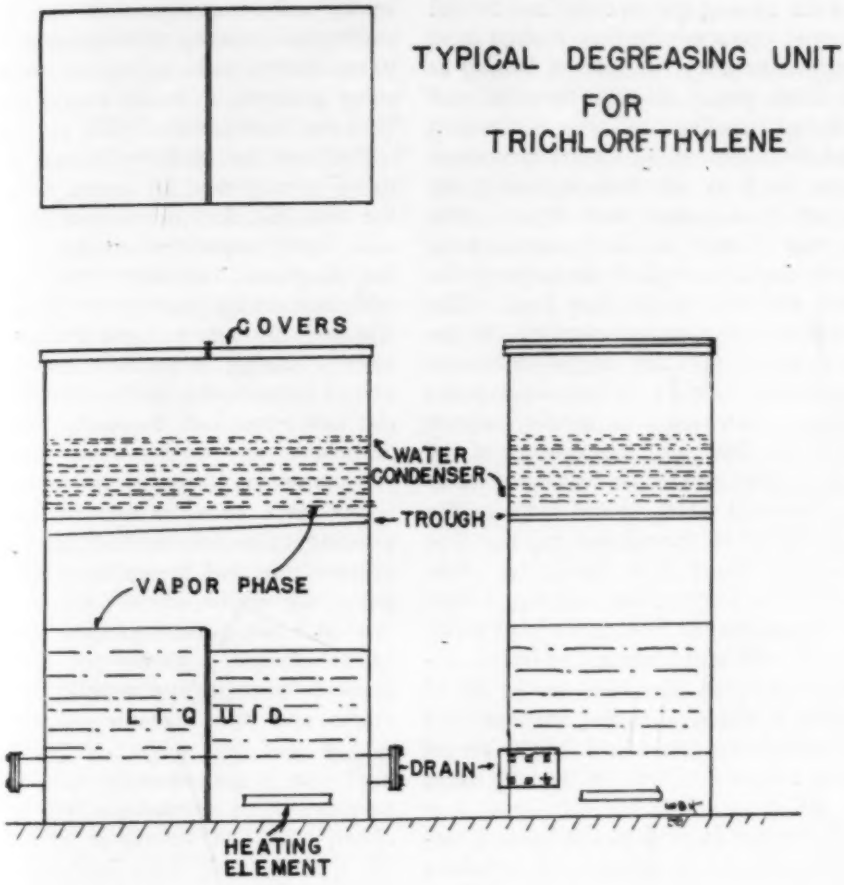
PHYSIOLOGICAL ACTION

While various authors may disagree on the physiological damage resulting from breathing small concentrations of trichlorethylene it is rather generally agreed that it is toxic and that continued exposure to trichlorethylene vapors constitutes a potential health hazard.

The New York State Department of Labor [2] studied three individuals who were exposed to trichlorethylene vapors and found symptoms referable to the gastrointestinal and central nervous systems, such as nausea, dizziness, diminished vision, headache, and general ill feeling. Operators of trichlorethylene degreasing tanks frequently complain of headache, dizziness, and nausea.

In the operation of a trichlorethylene degreasing tank, the solvent is heated to the boiling point with the consequent generation of concentrated vapor in the tank over the boiling liquid. The parts to be cleaned are dipped into the liquid and then suspended in the vapor zone for rinsing before withdrawing from the tank. A condenser built into the tank walls cools the vapor, causing it to condense and return to the liquid supply, thus utilizing the solvent over and over. A well adjusted balance between heat input, cooling capacity, rate of input of metal, and cleanliness of the solvent is required in order to insure the continuous operation of the cycle without escape of excessive quantities of the vapor from the tank. The constant generation of vapor, however, establishes a potential health hazard which becomes real when the operating balance between the liquid and the vapor is not constantly maintained. Because the loss of trichlorethylene vapor from the tank represents an increase in operating cost, the matter of proper operation assumes economic as well as hygienic importance and is thus more likely to be watched. However, degreasing equipment of this type is widely used in small manufacturing plants where quarters may be limited and supervision and maintenance poor, and the potential hazard associated with the use of trichlorethylene in such establishments is therefore greater than that existing in large plants. Hence, it is important to inquire into the requirements for proper design and safe location and operation of degreasing tanks and to determine the need for and design of ventilating systems for such equipment. This report deals with such an inquiry involving the survey of 50 plants in metropolitan New York with the detailed study of 15 of these. The plants were selected at random to give a good sample of conditions and include 26 of one manufacture, 20 of another, and 4 of home-made construction. In size the tanks varied from 140 sq. in. to 15 sq. ft. and were located in rooms varying from 2,000 to 375,000 cu. ft. in volume.

FIGURE I—Diagrammatic sketch of degreasing tank



DESIGN OF TANK

The degreasing equipment in its simplest form consists of a metal tank with heating elements in the bottom for heating the solvent, a water condenser around the upper walls of the tank for cooling and condensing the vapor, with a condensate trough below the condenser into which the condensed solvent drains and from which it flows back into the boiling liquid. The walls of the tank extend well above the condenser to provide adequate free-board above the concentrated vapor level to protect contents against external drafts and the drag out of solvent. For cleaning, a distilling arrangement is provided to permit removing the clean distillate from the tank, and a suitable sump drain allows for the removal of the sludge and other residue from the bottom of the tank. A cover is provided for closing the tank when not in use. A simple tank is shown diagrammatically in Figure I. There are many variations from this simple design. In one type of tank three separate compartments are provided for washing, rinsing, and drying respectively. Another type allows for immersion in the vapor only. In all these modifications, however, there is no essential departure from the basic cycle of operation outlined above although the efficiency of operation may be improved.

The design of the heating element and the cooling system calls for a careful thermal balance with just enough heat supplied to keep the solvent boiling as the work passes through the tank and sufficient cooling in the condensing zone to maintain a definite maximum vapor level at all times including the period of maximum heat input. The thermal balance is best maintained by thermostatic control of the heating element and also of the dew level. The optimum water temperature at the inlet is about 70° and at the outlet approximately 90° F. The coolest point in the condensing zone should not fall below the dew point temperature of the room to prevent the condensing of water from the air which would increase the diffusibility of the solvent vapor. The maximum vapor level should be maintained at a height above the liquid level of approximately 0.6 times the width of the tank and with a free-board distance from the dew level to the lip of the tank of 15". Among the tanks investigated the free-board height varied from 2" to 20" with a median value of 14".

When gas is used as the heating medium, adequate venting of the combustion chamber to the outside atmosphere must be provided, not only to remove products of combustion, but also to remove hydrochloric acid, phosgene, and other products of heat decomposition of the trichlorethylene vapor. Because of the corrosive nature of these decomposition products it is essential that the vent pipes be constructed wholly of corrosion-resisting materials.

Safety thermostats of the manual re-set type should be installed above the operating vapor level and also immersed in the liquid when the latter is heated by gas or electricity. The function of the first is to shut off the heat when the concentrated trichlorethylene vapor for any reason rises above its normal operating level, while the second operates to limit the temperature of the heated solvent to prevent too rapid boiling and possibly decomposition. For steam heated tanks a pressure reducing valve is required in the steam line to limit the pressure to 25 lbs. per sq. in.

Facilities for cleaning include a distilling arrangement by means of which the clean distillate is removed from the tank into a separate container, leaving the oil, grease, and other residue in the tank as a sludge, part of which may be removed through a sump drain. The viscous sludge, however, must be removed by scraping, and a suitable side cleanout door is required for this purpose.

Most of the foregoing design requirements have been incorporated in degreasing tanks of standard commercial manufacture and in addition the large tanks are commonly of the enclosed type with automatic feeding of the parts to be cleaned. This type of equipment is more independent of external drafts and also, because of its fixed rate of feed, less subject to fluctuating load than is the manually operated apparatus. The advantages of the enclosed tank and automatic feed are so great that small units are also being so built. Every encouragement should be given to this development.

SIZE OF TANK

Employ a tank large enough to permit the complete immersion of the parts to be cleaned in the liquid solvent and later in the vapor. In one plant oversize parts were being cleaned in a small tank with the part actually projecting above the top of the tank. The hot solvent was applied by means of a long-handle dipper well above the condenser with consequent escape of large quantities of vapor.

OPERATION

The manufacturers of degreasing tanks have prepared comprehensive in-

structions for the safe operation of their equipment. These instructions include information relative to speed of operation, precautions against decomposition of the solvent, technic of cleaning tank, etc., and they should be carefully studied and followed in the plant operation.

SPEED OF OPERATION

The rate at which parts are put through the degreasing tank affects the thermal balance between the boiling solvent and the vapor zone and thus influences the efficiency of cleaning. It also has a direct bearing upon the escape of solvent from the tank. At high speed the parts may come out with liquid solvent still adhering to them and also the rapid movement of the basket and objects into and out of the tank causes a disturbance which results in the escape of vapor-laden air. The importance of controlling the operating speed is clearly shown by the following case report:

> Three old tanks were operated at a high production rate in a small room (2,000 cu. ft.) with a great deal of external air movement in the neighborhood of the tanks, with the consequent escape of vapors in considerable amounts. Cleaned parts were also found to have liquid solvent adhering to them after removal from the tank. The concentration of organic vapor at the operator's breathing level was found to be 500 p.p.m.* Following this study the old tanks were replaced by equipment of the latest design; the external drafts were eliminated; and a ventilated table was provided for the temporary holding of the cleaned parts until they were dry and cool. The production rate, however, continued at a high level and a second investigation showed that the average concentration of vapor had been reduced only to 300 p.p.m. in spite of the great improvement in equipment and working conditions.

A rate of feed of parts through the degreasing tank of 8–12′ per minute is generally recommended and should be carefully followed. It is important also to follow the manufacturer's instructions with respect to the holding period in the hot liquid and in the vapor zone. In the liquid bath the parts should be held long enough to be thoroughly washed but should not be allowed to reach the temperature of the boiling solvent. The parts must remain in the vapor zone, however, until they do reach the vapor temperature, at which point condensation ceases and the parts will then be dry as soon as they have been raised above the vapor level. Consideration must be given to the shape of the parts since those with cavities, fine cracks or seams, or parts that rest closely in the basket require a longer washing period, and also there is greater danger of carrying liquid solvent out of the tank.

CONTAMINATION AND DECOMPOSITION OF SOLVENT

The solvent becomes dirty with use. This contamination increases its boiling point and thus changes the thermal balance in the apparatus. If allowed to increase too far there is danger of heat decomposition which results in the liberation of free acid in the bath. Cleaning of parts freshly dipped in an acid bath will also increase the acidity of the solvent. In operation, therefore, the solvent must be maintained in a clean condition by frequent distilling and cleaning of the tank and through proper adjustment, its reaction should be maintained slightly alkaline. The importance of this control in connection with the cleaning of aluminum parts has already been shown.

In use the solvent also becomes contaminated with water which upsets the efficient operation of the equipment and increases the escape of solvent from the tank. The water must be removed at frequent intervals and this is best done by an automatic water separator built into the degreasing tank.

* All vapor concentrations reported in this paper were determined by means of a portable interferometer calibrated for trichlorethylene vapor. The limit of accuracy of this instrument is ± 20 p.p.m.

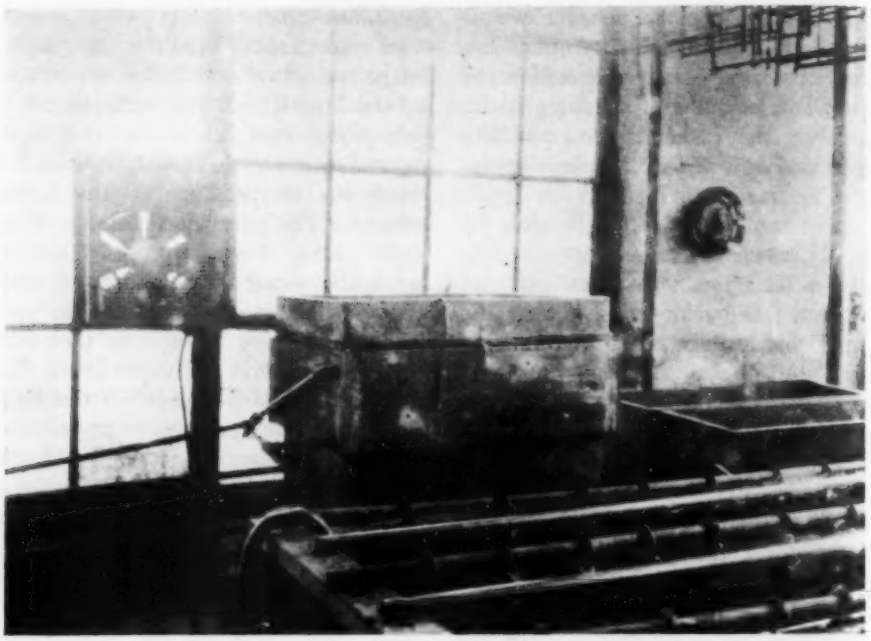


FIGURE II—Tank located by window and fan--high solvent loss

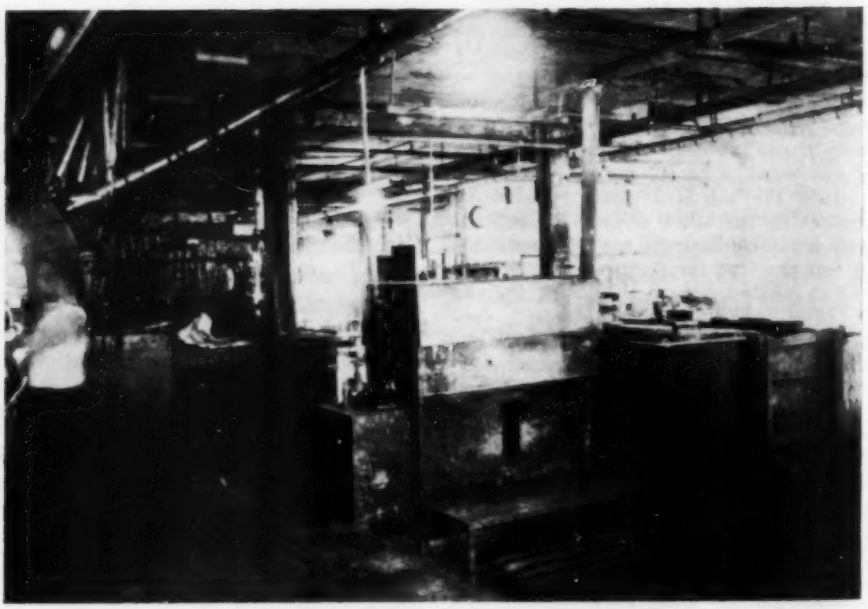


FIGURE III—Tank favorably located in large room

CLEANING

The amount of work done and the quantity of oil and dirt removed determine the frequency with which the solvent and machine should be cleaned. In general, the boiling point of the solvent should not be allowed to exceed 195° F. or the specific gravity to drop below 1.25, and these indices may be used to determine when cleaning is required.

The tank cleaning cycle is as follows: The solvent is boiled and the condensate removed into a separate container by suitable adjustment of the valves in the pipe line leading from the condensate trough. Boiling is continued until all solvent is removed, after which the sump valve is opened to permit the removal of oil and other liquid residue. Metal chips, mud, and other solid residue must be removed by scraping and for this a cleanout door is required on the side of the tank through which the sludge is removed by means of a long-handle scraper of suitable design. Otherwise the operator is forced to bend over the tank and thus expose himself to extremely high concentrations of vapor. It is clear that the solvent, liquid residue, and sludge should be confined as much as possible to minimize the escape of vapor. Cleaning is best done out of regular plant working hours, and the operator should be provided with a suitable respirator for use during the cleaning period. A cartridge type of respirator for absorption of organic vapors is best for this work, with a new cartridge used for each cleaning. The importance of careful control of the cleaning technic is attested to by the frequent complaints on the part of the operators, of dizziness and nausea during cleaning.

COOLING CLEANED PARTS

The cleaned objects come from the degreasing tank at a high temperature and in some plants it is customary to cool them for immediate use. Exhaust ventilation to the outside rather than positive blowing should be used when an air stream is required for rapid cooling of cleaned objects. This method should also be used for drying parts, when there is danger of dragout of solvent. Thus, in one plant we found a vapor concentration of 420 p.p.m. during the cooling period where positive air was used as compared with a level well below 100 p.p.m. during the actual cleaning operation. In spite of the fact that the tank was located in a very large room (150,000 cu. ft.) the average exposure was high because of this bad practice.

LOSS OF SOLVENT

In a properly designed and operated tank, the solvent loss should be maintained at a low figure, and in practice the actual loss incurred constitutes a good measure of efficient operation and control of the health hazard. Our survey revealed that the solvent loss varied from 0.3 to 15 gal. per sq. ft. of tank area per 100 hrs. of operation with a median value of 3.5. The high losses were associated with careless operation and bad location with respect to drafts. The tank shown in Figure II is well located hygienically but badly from the standpoint of solvent loss.

LOCATION OF TANK

SIZE OF ROOM

For the most part the degreasing tanks were located in large rooms, only 10 being found in rooms less than 10,000 cu. ft. in volume. In the detailed study of the 15 plants the beneficial effect of natural dilution of the vapor was observed in all cases where the room volume was 20,000 cu. ft. or more and no disturbing drafts were present. Thus, in 4 different rooms varying from 20,000 to 150,000 cu. ft. in volume and provided with general ventilation at the rate of 5–12 air changes per hr., the concentration of

TABLE I

Vapor Concentration in Relation to Rate of Ventilation in Small Rooms

Plant No.	*Room Vol. Cu. Ft.*	*Rate of Ventilation Air Changes per Hr.*	*Vapor Concentration*	
			Breathing Zone p.p.m.	*General Room Air p.p.m.*
6B	2,500	5	500	290
15D	6,000	10	290	230
10B	4,000	23	500	100
13D	2,000	Natural, strong	340	80
18D	8,000	23	400	20
19D	8,000	50	60	0

trichlorethylene vapor was zero in the general room air while in the breathing zone of the operator the maximum concentration did not exceed 150 p.p.m. The solvent losses reported for the 4 tanks were 1.0, 3.0, 4.5 and 5.3 gal. per sq. ft. per 100 hrs. operation respectively. The location of one of these tanks is shown in Figure III.

In contrast to the results reported above, the vapor concentration in smaller rooms was found to be high, even in the general air, except when adequate ventilation was provided. The data presented in Table I indicate that all tanks located in confined spaces should be safeguarded by means of general ventilation at a rate of 30 air changes per hr. It is to be observed, however, that general ventilation alone is not enough to control the exposure directly at the breathing level of the operator, and local exhaust ventilation may be required in addition. When used in conjunction with local exhaust ventilation the rate of general ventila-

FIGURE IV—Tank located in confined room

tion can probably be reduced below 30 air changes per hr.

The location of a degreasing tank in a confined space does not necessarily mean a separate closed room. Location in a pocket off a large room as in Figure IV, or in a pit below floor level, gives the same undesirable results. In one case of a tank placed in a small extension to a room 120,000 cu. ft. in volume, the vapor concentration around the tank averaged 340 p.p.m. with a maximum of 1,080 p.p.m. Pit locations should be particularly avoided because of the high density of the vapor which causes it to collect at low points. All pits containing storage tanks, pumps, or other appurtenances to degreasing equipment should be provided with positive ventilation.

DRAFTS

The tank location must also be selected to avoid disturbing drafts created by open windows and doors, fans, etc., since the action of such drafts is to drag vapor out of the tank and disperse it in the room. In this connection, the location of the tank must be carefully considered in relation to paint spray booths which are commonly operated in conjunction with degreasing equipment. Spray booths require high rates of ventilation, and strong air currents are thus established in the immediate neighborhood. In one plant the opening of the doors was found to create a strong draft by the tank which was corrected by erecting an entrance vestibule. Drafts may be created by the general ventilating system. To prevent this air inlets should be located near the ceiling, remote from the tank, and provided with upward deflectors, while outlets should be placed near the floor since the heavy vapor tends to gather at low points.

A gas heated degreasing tank with natural draft ventilation of the combustion chamber should not be located in a room in which a mechanical exhaust system is installed unless ample free opening is provided for the intake of make-up air for the exhaust system. Otherwise a negative pressure might develop in the room which would cause a reversal in the direction of air flow through the natural draft vent pipe and thus bring the flue gases into the room. These gases may include not only the toxic products of gas combustion but also phosgene resulting from the pyrolysis of trichlorethylene. The escape of trichlorethylene vapor into a room in which welding and similar high-temperature operations are going on also presents a potential phosgene hazard and must be avoided.

TANK VENTILATION

The present study reveals that a degreasing tank of adequate design and capacity located in a large room free from disturbing drafts and properly operated with respect to thermal balance, cleanliness of solvent, and speed of operation does not create an exposure to trichlorethylene vapor in excess of 150 p.p.m. as the data in Table II show. Ideal conditions are not always found, however, since the results depend to a large extent upon the personal factor in operation. Thus in contrast to the favorable results shown in Table II we have other data indicating unsatisfactory vapor concentrations in spite of good locations, ample room volume, and excellence of tank design. Because there can be little control over the personal factor we believe that the added safeguard obtained through local tank ventilation is necessary for the safe operation of degreasing tanks except under the most favorable conditions. Specifically, it is recommended that local exhaust ventilation be provided whenever the degreasing tank is located in a room less than 20,000 cu. ft. in volume and also on tanks in larger rooms where there is

TABLE II

Vapor Concentrations in Satisfactory Plants

Plant No.	*Room Volume Cu. Ft.*	*Operation*	*Sample Location*	*Concentration p.p.m.*
23B	80,000	None	Breathing level of operator	105
23B		Parts imersed	" " "	105
23B		Parts immersed	" " "	21
23B		Parts in and out	" " "	126
23B		" " " "	General room air	0–42
6D	100,000	" " " "	Breathing level of operator	0–105
6D		" " " "	General room air	0
3B	20,000	" " " "	Breathing level of operator	0–63
3B		" " " "	General room air	0

danger of drafts, high-speed operation and poor supervision.

EXHAUST VENTILATING CAPACITY

The exhaust ventilation should be applied laterally at the edges of the tank since the heavy vapor tends to roll over the edge and fall to the floor. A ventilating rate of 60 c.f.m. per ft. of tank perimeter has been found to be adequate. This produces an air movement of approximately 20 f.p.m. toward the exhaust openings at a distance of one foot from the slot. The application of ventilation to the tank disturbs the vapor zone in the tank somewhat and increases the solvent loss. This loss obviously increases with slot velocity. Moreover, it is known that the efficiency of control by lateral ventilation at a given total rate of air flow decreases with an increase in slot velocity.[3] Hence, it is desirable to keep this velocity at a low figure. At the same time, the slot velocity must be high enough to make the entrance loss substantially greater than the internal loss in the section of duct into which the slot opens so as to provide for uniform air flow over the tank area and into the exhaust system. An entrance velocity of 500 f.p.m. appears to be the minimum practical value. Typical exhaust systems are shown in Figure V and Figure VI.

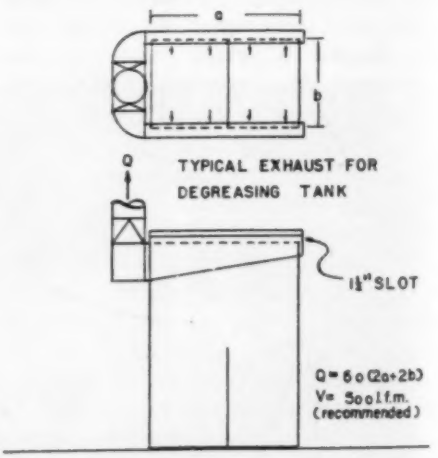


FIGURE V—Local exhaust ventilation applied to degreasing tank (diagrammatic)

RECOMMENDATIONS

As a result of this study of degreasing equipment and the survey of present conditions under which such equipment is installed and operated, we desire to make the following recommendations:

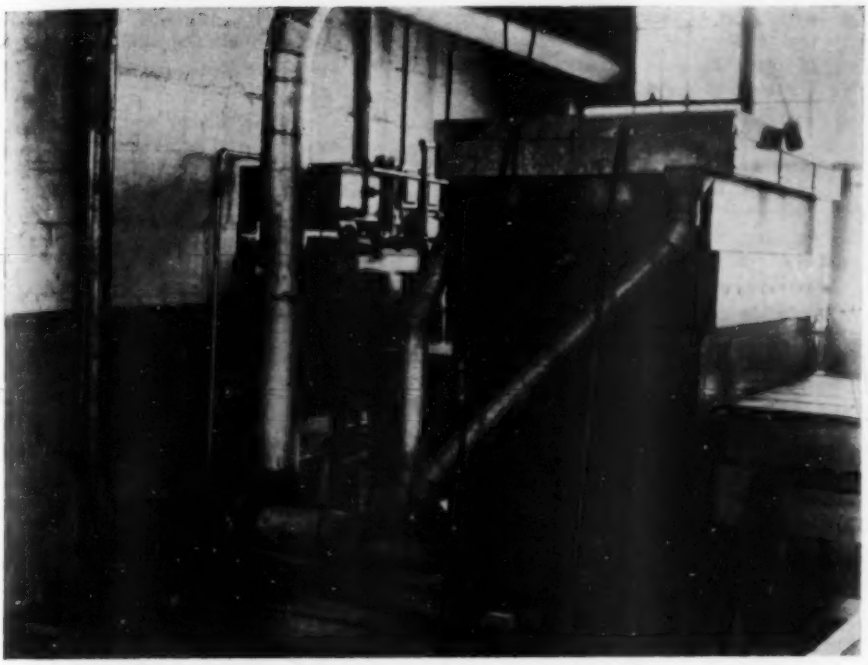


FIGURE VI—Degreasing tank provided with local exhaust ventilation

I. Design of Equipment:

A. Avoid the use of tanks and appurtenances other than of standard manufacture to insure proper design with respect to required balance between heat input, cooling capacity and thermostatic control.

B. In every case provide a tank large enough to permit the complete immersion in the solvent of all parts to be handled and wherever possible use an enclosed tank with automatic feed.

C. Provide a free-board distance from the maximum vapor level to the lip of the tank of not less than 15".

D. Provide a cleanout door for the removal of sludge.

E. Provide thermostatic control of the heating and condensing zones and in addition provide safety thermostats to limit the solvent temperature and vapor height.

F. For gas heated tanks, install a flue from the combustion chamber to the outside of adequate capacity and equipped with a proper diverter. The flue should be of acid-proof construction throughout its length.

II. Location of Equipment:

A. Wherever possible, locate degreasing tanks in rooms 20,000 cu. ft. or more in volume.

B. Avoid locations in pits below the floor level or in pockets opening off large rooms.

C. Do not locate tanks near paint-spray booths or other similarly ventilated equipment.

D. Eliminate all drafts in the area of the tank.

E. Gas heated equipment provided with natural draft ventilation must not be located in a room equipped with mechanical exhaust ventilation unless adequate fresh air inlets are provided to prevent the development of a negative room pressure.

F. Operations involving open flames, electric arc, or other sources of high heat must not be carried on near degreasing tanks.

III. Local Exhaust Ventilation:

A. All degreasing tanks in confined rooms (less than 20,000 cu. ft.) and other installations not favorably located or properly operated must be provided

with local exhaust ventilation. General ventilation is not recommended in place of local exhaust ventilation but may be required in addition.

B. Exhaust ventilation should be by lateral movement into slots along the edge of the tank with a ventilating rate of 60 c.f.m. per ft. of tank perimeter. The slot velocity should be approximately 500 f.p.m. and provide for uniform ventilation over the entire tank area.

C. Provide a ventilated booth or table where necessary for the temporary holding of cleaned parts for drying or for cooling.

IV. Operation:

A. Operate the degreasing tank in accordance with the manufacturer's instructions.

B. Pass work through the tank at a rate of 8–12′ per min.

C. Keep the tank closed when not in use.

D. Clean the solvent and tank at proper intervals and otherwise follow manufacturer's instructions to avoid decomposition and loss of solvent.

E. Provide solvent vapor absorbing type of respirators to be worn during tank cleaning operations.

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A Precipitative Method for the Titration of Tetanus Toxin and Antitoxin*

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THE obvious advantages of an *in vitro* test for determining the unit-content of tetanus toxin, or of antitoxin, has led a number of workers to try to use the flocculation test of Ramon for this purpose. Scholtz,[1] 1924, using Ramon's procedure, reported that his results indicated that the flocculation test was far less accurate than an *in vivo* test. Abt and Erber,[2] 1926, titrated a series of 51 samples of antitetanic serum by means of the flocculation test and claimed 90 per cent accuracy for about two-thirds of the samples tested. In only 1 of the 51 samples tested was a double zone of flocculation observed. Kalic,[3] 1928, in titrating 53 samples of tetanus serum, found two and occasionally three zones of flocculation; one showing a very rapid nonspecific flocculation over a wide area, and a second (corresponding to the animal tests), in which flocculation occurs much more slowly and in a comparatively narrow zone. Hoen and Tschertkow,[4] 1929, using a precipitative ring-test for evaluating antitetanic sera, obtained values that corresponded to the *in vivo* results. Gosh and Ray,[5] 1937, reported that tetanus antitoxin titrated by flocculation and *in vivo* generally agree to within about 10 per cent. Ramon, Lemetayer and Richon,[6] 1937, utilizing the flocculative technic show that the unit-content of toxin or toxoid as determined by this method checks reasonably well with the results of the corresponding animal tests. They recommend that the flocculative test be used in preference to the animal test for determining antigenicity.

Gay, in "Agents of Disease and Host Resistance" says that, "Attempts to standardize tetanus antitoxic serum by means of flocculation have not proved satisfactory."

It would appear from a review of the literature that the greatest difficulty in titrating tetanus toxin or antitoxin is the fact that often double or multiple flocculating zones occur, only one of which represents the specific toxin-antitoxic reaction.

This report presents a rapid precipitative method for the titration of tetanus toxin, toxoid, or antitoxin. Essentially, the method consists in mixing a constant volume of toxin with decreasing volumes of antitoxin, incubating for 30 minutes in a water bath,

* Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

and determining the degree of turbidity by means of the photronreflectometer.[7] The mixture giving the maximal reading corresponds to the neutral point and is the tube in which flocculation first appears if allowed to incubate for several hours at 45° C.

METHODS

In practice 2 cc. of toxin are mixed with decreasing volumes of antitoxin, diluted with 0.85 per cent salt solution so that it contains approximately 600–800 units per cc., the mixture is incubated in a 45° C. water bath for 30 minutes, and then the degree of turbidity is determined by means of the photronreflectometer.[7] It is shown in Table IV that the mixture showing the maximal turbidity, as indicated by the maximal galvanometric reading, corresponds approximately to the neutral point. Thus, if one utilizes an antitoxin of known unitage, it is possible to calculate the L_f units of an unknown toxin or vice versa. For example, if the mixture of 0.2 cc. of a serum containing 800 units per cc. with 2 cc. of a toxin gives the maximal galvanometric reading, then the L_f units of the toxin equals $\frac{800 \times 0.2}{2}$ or 80 L_f units.

EXPERIMENTAL DATA

1. *Typical photronreflectometric readings obtained with mixtures of tetanus toxin or toxoid and antitoxin*—Table I shows a typical series of readings obtained with mixtures of toxin and antitoxin after 30 minutes' incubation at 45° C. As indicated, the galvanometric readings increase up to a maximum with decreasing volumes of antitetanic serum and then decrease with a further decrease in the volume of serum in the mixture. Frequently, with larger volumes of serum than those shown in the table, a very rapid nonspecific precipitation occurs, so that in this zone the galvanometric readings will go off the scale in approximately 5 minutes. Because of the rapidity and degree of precipitation occurring in this zone, it is impossible to confuse it with the much slower specific toxin-antitoxic reaction.

2. *Constancy of the combining proportions of toxin and antitoxin*—Table II shows that the mixture of 2.0 cc. of toxin number 641B and 0.4 cc. of antitoxic serum number 6901 gave the maximum galvanometric reading after a 30 minute incubation period at 45° C. If one dilutes the above mentioned toxin 1:2 and mixes it with varying volumes of the same antitoxic serum, it can be

TABLE I

Typical Series of Photronreflectometric Readings Obtained with Mixtures of Tetanus Toxin and Antitoxin After an Incubation of 30 Minutes at 45° C.

cc. Toxin No. 753B	2.0	2.0	2.0	2.0	2.0	2.0	2.0
cc. Serum No. 2522 (dil. 1/4)	0.3	0.27	0.25	0.24	0.23	0.2	0.17
Galvanometric Reading	47.1	48.8	*50.5*	48.5	48.0	42.2	33.6
cc. Serum No. 2524 (dil. 1/3.5)	0.3	0.27	0.25	0.24	0.23	0.2	0.17
Galvanometric Reading	21.2	23.7	*24.6*	24.0	23.5	21.0	15.2
cc. Serum No. 2396 (dil. 1/3)	0.28	0.24	0.21	0.20	0.18	0.14	0.10
Galvanometric Reading	34.5	*35.5*	32.8	30.2	26.2	17.0	15.8
cc. Serum No. 2436 (dil. 1/4)	0.22	0.19	0.16	0.13	0.10	0.07	0.04
Galvanometric Reading	43.5	47.2	*48.3*	40.4	38.6	26.5	19.0
cc. Serum No. 2458 (dil. 1/5.6)	0.30	0.27	0.25	0.24	0.23	0.20	0.17
Galvanometric Reading	21.0	22.8	24.1	24.5	*27.0*	23.0	18.0

Maximal Reading Italicized

seen from the table that only half as much antitoxin, or 0.2 cc., is required to give the maximal reading. Similarly, if the antitoxic serum is diluted 1:2 and mixed with undiluted toxin, 0.8 cc., or twice as much antitoxin, is required to give the maximal reading. These data would indicate therefore, that using the mixture giving the maximal galvanometric reading in a series of toxin-antitoxic mixtures one may calculate either units of toxin or units of antitoxin in an unknown sample if standardized antitoxin or toxin respectively is utilized.

TABLE II

Precipitation of Tetanus Toxin and Antitoxin

Effect of Diluting Toxin or Antitoxin on the Mixture Showing Maximal Turbidity

cc. Toxin No. 641B	2.0	2.0	2.0	2.0	2.0	2.0	2.0
cc. Antitoxin No. 6901	0.55	0.5	0.45	0.4	0.35	0.3	0.25
Galvanometric Reading, 30 min.	37.0	38.0	41.0	*46.2*	45.0	38.0	29.2
cc. Toxin No. 641B, diluted 1:2	2.0	2.0	2.0	2.0	2.0		
cc. Antitoxin No. 6901	0.4	0.3	0.2	0.1	0.05		
Galvanometric Reading, 30 min.	22.1	24.2	*29.0*	25.0	22.0		
cc. Toxin No. 641B	2.0	2.0	2.0	2.0	2.0		
cc. Antitoxin No. 6901, diluted 1:2	1.0	0.9	0.8	0.7	0.6		
Galvanometric Reading, 30 min.	31.0	39.0	*42.2*	41.0	34.0		

Maximal Reading Italicized

3. *Effect of incubation time on the maximal galvanometric reading*—Table III shows a typical series of readings taken after 10, 20, and 40 minutes' incubation at 45° C. As indicated, the mixture of 2.0 cc. of toxin number 758B and 0.16 cc. of antitoxic serum number 6901 gave the maximal reading regardless of the time interval. It is also shown that this same tube corresponds to the mixture that gives the most rapid and voluminous flocculation if allowed to incubate for a considerably longer time at 45° C. In routine titrations, an arbitrary incubation period of 30 minutes at 45° C. has been adopted because, as is well known, considerable variation in both the flocculation and precipitation time occurs between different samples of toxin or toxoid and various samples of antitoxic serum. In no instance, out of several hundred titrations, employing 5 different samples of toxin or toxoid, has it been necessary to incubate for longer than 30 minutes to differentiate the mixture giving the maximal reading.

TABLE III

Precipitation of Tetanus Toxin and Antitoxin

Effect of Incubation Time on the Maximal Galvanometric Reading

Also Time of First Flocculation

Incubated at 45° C.					
cc. Toxin No. 758B	2.0	2.0	2.0	2.0	2.0
cc. Antitoxin No. 6901	0.18	0.16	0.14	0.12	0.10
Galvanometric Reading, 10 min.	29.2	35.0	30.0	30.5	30.0
Galvanometric Reading, 20 min.	43.2	50.8	40.1	40.9	37.1
Galvanometric Reading, 40 min.	49.5	* 60.0+	60.0	53.0	40.0
Flocculation 125 minutes	—	++++	++	—	—

* Reading off scale

TABLE IV

Titration of Antitoxic Units

2 cc. of Toxin No. 753B—98 L_f Units per cc. or L_f Dose = .0102

Serum Sample Number	*Serum Diluted*	*cc. of Serum to Give Maximal Turbidity*	*Calculated Antitoxic Units Photronreflectometric Titration*	*Calculated Antitoxic Units by Animal Test*	*Ratio Animal-Test-Titer / Photo-Test Titer*
2505	1/4	0.22	3,560	3,400	0.955
2504a	1/4	0.16	4,900	4,800	0.980
2436	1/4	0.16	4,900	5,000	1.020
2529	1/4	0.17	4,610	4,750	1.030
2530	1/4	0.15	5,230	5,250	1.004
2531	—	0.21	930	1,100	1.183
2504b	1/8	0.32	4,900	4,800	0.980
2349	1/3	0.28	2,100	2,200	1.047
2354	1/6	0.24	4,900	5,000	1.020
2379	1/4	0.26	3,070	3,000	0.978
2396	1/3	0.24	2,450	2,500	1.020
2427	1/5	0.26	3,840	4,100	1.067
2458	1/5.6	0.23	4,770	4,500	0.944
2466	1/3.7	0.26	2,800	3,000	1.071
2516	1/6.2	0.25	4,860	5,000	1.028
2522	1/4	0.25	3,140	3,200	1.019
2524	1/3.5	0.25	2,740	2,800	1.022
		Mean	3,750	3,790	1.022
					±0.052
					$PE_m = \pm 0.00852$

4. *Correlation between contents of antitoxic units determined by the precipitative method and those determined by animal tests*—Table IV shows such a comparison. As shown, the mean value of the ratio of the unit-contents determined by animal test to those determined by the precipitative method is 1.022 with a standard deviation of ±0.052. This indicates that a reasonable degree of correlation exists between the two tests and that in general one may expect the two titrations to check within 7 per cent. This agrees with the findings of Abt and Erber in 1926, and Gosh and Ray in 1937, using a flocculative technic.

DISCUSSION

From the data given it appears that the precipitative technic outlined for the titration of tetanus toxin or antitoxin offers a rapid, quantitative method for the estimation of toxic or antitoxic titers; however, it should be pointed out that only a limited amount of data is available at present and that more samples should be tested before final conclusions are drawn. For example, there appears to be a difference in the combining proportions of refined and concentrated antitoxin with a standardized toxin and unrefined antitoxic serum with the same toxin. Data concerning this problem will be given in a subsequent report.

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Health Problems in Packing Crustacean Products*

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THE nature of crustacean food products is such that they are usually placed at the disposal of the consumer after they have been cooked. They may be canned, in which case they are ordinarily sterilized, but often are sold freshly cooked or cooked and frozen. In those cases where unsterilized, cooked crustacean products are prepared for the consumer's use, care must be taken to eliminate and to prevent the entrance of bacteria which might be detrimental to health. The federal government has long maintained a watchful interest in shellfish and crustacean products in interstate commerce and for the most part the state governments in those areas where food plants of this type are to be found have coöperated with the federal government by the application of sanitary control measures. It is, however, the packer's problem to enforce the proper sanitary measures, since in most cases the state government is not able to supervise the operation at all times. Yet his product must satisfy the health requirements of the U. S. Food and Drug Administration when it enters interstate commerce.

Research and control experiments, carried out in connection with the preparation of frozen, cooked crustacean products have brought out certain facts which, it is believed, might be of interest to the industry in general.

METHODS OF CONTROLLING CONTAMINATION

Cooking—It is the practice in those states neighboring the Chesapeake Bay to "pressure-cook" crabs. In other states crabs are often cooked by the older method of boiling. Lobsters and shrimps are more often cooked by boiling although there is no reason why pressure cooking is not applicable to these products.

When pressure cooking is properly carried out the packer can be sure that all fecal or related microörganisms have been eliminated. Pressure cooking offers the further advantage of a more uniform product in flavor and texture.

Many plant managers overlook the fact that the pressure cooker offers an excellent means of sterilizing equip-

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ment. Pans, knives, baskets, etc., can be quickly and efficiently sterilized in a pressure cooker at the start of the day's work and at the noon recess, thus helping to prevent contamination of the product with microörganisms.

In the New England States lobsters are generally cooked in a salt water solution for 10 to 15 minutes, the time depending on the size of the lobsters. Although this method of processing lobsters produces an edible and palatable food, experiments carried out on lobsters known to be polluted have indicated that viable fecal organisms are not eliminated from the gills and intestinal tract by this treatment in the short periods used commercially. In fact, with lobsters of medium size it was found necessary to boil as long as 29 minutes to remove all fecal organisms from the intestinal tract. Since lobsters are sometimes stored in polluted waters, the significance of the foregoing from a health standpoint is obvious. On the other hand, the long cooking which toughens the flesh is reduced to a minimum in pressure cooking and a superior as well as more healthful product results.

Chlorine Treatments (external in vitro)—Chlorine solutions are often used in food plants for the purpose of eliminating organisms which, if present in the finished product, might tend to cause decomposition or result in a food material unsuitable from the standpoint of public health. Chlorine, in weak solutions, is sometimes applied to food products themselves but is more often used as a germicide to remove organisms from utensils or other apparatus which might come in contact with the product.

If chlorine solutions are to be applied to crustacean products which are to be frozen, a certain amount of care must be exercised. In high concentrations (above 10 p.p.m.) chlorine may cause chemical changes in foods while they are held frozen in storage, and thus decrease their storage life to only a few months. These changes result in a deterioration of both color and flavor. This is especially true in the case of crustacean meats.

Chlorine Treatment (internal in vivo)—Dilute chlorine solutions have long been utilized for the purification of shellfish. Two types of treatment are used. In the State of Massachusetts [1] it has been the custom to condition clams in sea water containing a residual of from 0.3 to 0.5 p.p.m. of chlorine. This concentration of chlorine is maintained throughout the treatment. In England [2] and at the State Shellfish Demonstration Plant at Willoughby, Norfolk, Va.,[4] a slightly different method is used. Shellfish are given a short preliminary treatment with sea water containing a relatively large proportion of chlorine (up to 5 p.p.m.), after which they are held for longer periods in sea water, previously chlorinated to remove fecal organisms, but containing no chlorine.

It is the claim of those adherents of the type of purification used in England that the oyster or clam is purified and cleaned by its own biological and physiological activity, rather than by chlorine in the water used during treatment. Thus, if the available water is sterile, shellfish will clean themselves, provided other environmental factors are suitable. Since chlorine irritates molluscs, causing them to cease drinking, conditions are said to be more suitable for purification when this substance is absent from the sea water used. Chlorine is used with the English method primarily to eliminate fecal organisms from the treatment water before it is used to condition the molluscs.

With both procedures the time of the conditioning process varies with the degree of purification required, the relative pollution of the shellfish at the start, the temperature of the treatment water, etc.

While clams and oysters are often removed from polluted areas and given purification treatment before they are placed on the market, the authors are not aware that this method is employed commercially for crustaceans. It is nevertheless true that both crabs and lobsters are sometimes floated in water known to contain numerous fecal organisms.

VALUE OF CHLORINE IN SANITARY CONTROL OF CRUSTACEAN PACKING OPERATIONS

Chlorine solutions are of considerable assistance in the maintenance of sanitary plant conditions provided they are utilized in an intelligent manner. It is of little use to use chlorine on utensils that are covered with organic matter, since the chlorine is removed from solution by such material. It is, therefore, necessary to clean utensils and apparatus before using chlorine because the mere use of a chlorine solution by itself will not suffice.

It should not be expected that the use of chlorine solutions on crustacean products themselves will solve all sanitary problems. Since such substances are organic in nature they remove chlorine from solution. If, therefore, chlorine is to be used there must not be an accumulation of organic waste material in the wash water, for a stage will finally be reached at which chlorine is removed faster than it can be added. Even though there is no accumulation of waste organic matter chlorine must be constantly supplied to such wash water for the reason that it tends to combine slowly with the product. It is probable that the most suitable method of using chlorine in wash water for crustacean meats is to maintain a constant flow of water containing a definite amount of available chlorine. For all practical purposes, this can be easily arranged by setting up a constant flow of water through a tank containing a small, valveless outlet, a solution of sodium hypochlorite, or other suitable chlorine source, being allowed to drip slowly from an aspirator bottle into the stream of the incoming water. The amount of chlorine used can be regulated by screw clamp and rubber hose, so that the concentration of this substance in the wash water remains approximately constant for any given flow.

If a food material contains fecal organisms it is hardly possible to remove them by treatment with ordinary chlorine solutions. It has been found that lobster meat containing fecal organisms can be soaked in water containing 10 p.p.m. of chlorine for as long as 2 minutes without destroying all *Escherichia coli* in the product. A concentration of 10 p.p.m. of chlorine was maintained throughout the 2 minute interval; moreover, the lobster meat had been contaminated externally with the bacteria.

Although undesirable organisms are not always removed from shellfish meats by treatment with chlorine it is often quite desirable to use this agent in wash water when packing crustacean products. This is especially true in the case of lobsters where it is necessary to wash tail meat to remove liver particles. The chlorinated wash serves to maintain a low bacterial population in the water, thereby preventing the inoculation of the product with bacteria.

CONTROL OF PACKING OPERATIONS

During the preparation of crustacean products, to be sold as fresh frozen, it is necessary to maintain a constant vigilance with respect to sanitary measures. Whether the product be crabs, shrimps, or lobsters, the proper procedures are much the same. Sanitary type utensils are helpful and often necessary. In this connection utensils, tables, etc., made from stainless steel or an equally non-corrosive material are efficacious since such implements are very easy to clean. Zinc, and galvanized

iron while often utilized to cover tables used in the packing of crustacean products are not desirable for several reasons. An oxide tends to collect on equipment covered with these metals which promotes the accumulation of dirt and makes cleaning and sterilizing difficult. Moreover, these metals wear out quickly leaving holes which are often left unpatched, and hence become traps for waste materials. Even when such worn places are patched the resulting cover is not desirable since dirt-collecting ridges are unavoidable.

The elimination of flies is another problem which must be dealt with by the packer. In one case in which a shrimp product was found to contain *Escherichia coli* it became necessary to peel the shrimps before cooking, cook them in screened trays, cool in the cooking trays, and screen the packing line. Flies were found to be the source of contamination, and since it was impossible to eliminate all flies from the plant itself the above precautions were required.

One of the most important features of packing crustacean products is the training of the workers, a feature which is often overlooked. It is useless to attempt to eliminate the coliform group from a food material if the workers are to handle contaminated articles and then handle the product without properly cleansing their hands. Although state and federal authorities issue statements summarizing sanitary procedures which, if followed, would assure the elimination of fecal organisms, many pertinent points may be easily neglected by a large number of packers unless the utmost control is exercised.

PURIFICATION EXPERIMENTS ON CRUSTACEA (*the blue Crab—Callinectes sapidus*)

The blue crabs taken from the Chesapeake Bay area often come from polluted water localities. In order to eliminate fecal organisms, therefore, packing plants in this vicinity usually employ pressure retorts for cooking crabs. A pressure of from 13 to 15 lbs. for 15 to 20 minutes is used. Since the time is taken at the moment that the steam is turned on, the actual pressure-time period cannot be stated. The load in the retort, the efficiency of exhaustion, the temperature of the crabs entering the retort, and other factors determine the temperature-time period of the cook.

The composition of crustacean muscle is such that it is toughened when cooked for long periods. This toughening persists or may even increase after such products are frozen, as storage at temperatures below freezing continues. Provided the cooking of crustacean meats is not too severe, there is little toughening of the product after freezing and during storage.

It seemed, therefore, that a better product might result provided the cooking time was shorter. Moreover, it might be possible to obtain a greater yield by shortening the processing time. Since the long cooking is necessary to destroy organisms which might be detrimental to health it would become necessary to remove them by some other method if the time of cooking were shortened. Conditioning or purification treatment appeared to be the only suitable method by which to remove fecal organisms prior to processing.

THE PURIFICATION STATION

The research concerned with the purification of the blue crab was carried out at the State Shellfish Demonstration Plant at Willoughby, Norfolk, Va. This plant is a two story frame structure 21 ft. by 25 ft. in plan and 18 ft. high.

The treatment tanks, installed on the first floor, were wooden and similar to those designed by Dodgson at Conway, England.[2] The small treatment tank used was 4 ft. long, 2 ft. wide, and 3 ft. deep, and constructed of cypress lum-

TABLE I

Milligrams of Dissolved Oxygen Consumed per Dozen Crabs per Hour

Temperature of Water	*Lot No.*	*Milligrams of Dissolved Oxygen Used per Dozen Crabs per Hour*
25° C.	3	248.80
25.3° C.	4	240.10
27° C.	14	254.13
27° C.	17	262.16
29° C.	15	268.60
29.3° C.	18	271.16

ber 0.15 ft. thick. A baffle was located at each end of the tank and a penstock gate at the inlet end facilitated cleaning of the floor. The floor of the tank contained a false grated bottom and had a slope of 1:50 toward the outlet end.

The water storage tank was also located on the first floor. This tank held 1,400 gallons and contained a mixing baffle at each end. Carborundum air diffusers were located near the outlet end. The sea water, pumped from Hampton Roads through a 2½ in. suction line, first entered a mixing baffle where the chlorine solution, used to remove fecal organisms from the water, was added. The amount of chlorine solution entering the tank could be regulated through a graduated valve on the container in which it was held. The mixing baffle in the outlet end of the storage tank could be used for adding thiosulfate to neutralize chlorine if desired. Aeration of the water was accomplished through the carborundum diffusers in the outlet end of the tank. A pump room, located on the first floor, contained a single unit by means of which water and air were pumped to the storage tank.

EXPERIMENTAL PROCEDURES

The crabs used in purification experiments were obtained from the Chesapeake Bay in areas known to be polluted.

The size of the treatment tank was such that only a small number of crabs (21 to 81) were used for each test. The storage tank was first filled with sea water, enough chlorine being added to allow a residual of approximately 0.5 p.p.m. immediately after filling operations were completed. The residual chlorine dissipated in a period of ½ hr. while, at the rate that water was allowed to flow through the treatment tank, about 3½ hrs. were usually required to empty the storage tank.

The crabs were given an initial washing with salt water and placed in the treatment tank. At this time 3 crabs were removed for laboratory test. In some cases crabs were placed on racks, in the normal position, but usually were free to swim about in the tank. Water from the storage tank was then allowed to flow into the treatment tank until filled, after which inlet and outlet valves were so regulated that the water level remained approximately constant. With the loss of head in the storage tank the speed of water flow was lessened; it was therefore necessary to regulate the flow at the inlet valve from time to time. The water was aerated periodically, about 6.5 p.p.m. of dissolved oxygen being present at all times. When the storage tank was nearly empty it was again pumped full, chlorine being added as previously. The

TABLE II

Number of Gallons of Water Required per Dozen Crabs per Hour to Keep the Dissolved Oxygen Constant During Treatment

Temperature of Water	*Lot No.*	*Gallons of Water Required per Dozen Crabs per Hr. to Keep Dissolved Oxygen Constant*
25° C.	3	9.92
25.3° C.	4	9.67
27° C.	14	10.10
27° C.	17	10.52
29° C.	15	10.77
29.3° C.	18	10.87

TABLE III

Bacterial Reduction During the Period of Purification

Lot No.	Treatment Time (hrs.)	Temperature of Water	Amt. of Chlorine in Water During Treatment as p.p.m.	Part Examined	Coliform Organisms Present: At Start M.P.N.	Coliform Organisms Present: After Treatment M.P.N.	Approximate Percentage Reduction
1	24	24 to 25.0° C.	0.01 to 0.1	gills	730	4.6	99
				gizzard	...	...	..
				intestine	1,100	0	100
2	24	24.5 to 25.5° C.	0.01 to 0.4	gills	1,600	62	96
				gizzard	11,000	0	100
				intestine	11,000	0	100
3	24	24.0 to 25.0° C.	0.0 to 0.1	gills	5,400	61	98
				gizzard	11,000	30	99
				intestine	11,000	0	100
4	24	24.75 to 25.25° C.	0.0 to 0.7	gills	6,800	31	99
				gizzard	4,600	4,600	0
				intestine	11,000	110	99
5	24	24.0 to 25.0° C.	0.01 to 1.0	gills	50,000	5.6	99
				gizzard	1,100,000	0	100
				intestine	4,600	0	100
6	24	24.0 to 25.0° C.	0.04 to 0.9	gills	7,800	78	99
				gizzard	4,600	0	100
				intestine	11,000	0	100
7	24	24.25 to 25.0° C.	0.04 to 0.1	gills	5,000	68	98
				gizzard	4,600	15	99
				intestine	11,000	0	100
8	24	24.25 to 25.0° C.	0.1 to 2.0	gills	8,400	0	100
				gizzard	4,600	46	99
				intestine	4,600	0	100
9	24	24.5 to 25.5° C.	0.1 to 1.5	gills	8,400	0	100
				gizzard	27,000	0	100
				intestine	11,000	0	100
10	24	24.25 to 25.0° C.	0.01 to 0.7	gills	7,300	15	99
				gizzard	11,000	0	100
				intestine	1,100	0	100
11	24	24.25 to 25.25° C.	0.07 to 0.45	gills	7,300	31	99
				gizzard	460,000	0	100
				intestine	11,000	11,000	0
12	24	24.25 to 25.25° C.	0.01 to 0.09	gills	15,000	0	100
				gizzard	110,000	0	100
				intestine	11,000	0	100
13	24	25.5 to 26.25° C.	0.1 to 0.25	gills	1,000	170	83
				gizzard	24,000	240	99
				intestine	4,600	120	97
14	24	27.0 to 29.0° C.	0.05 to 0.15	gills	150,000	3	99
				gizzard	240,000	46	99
				intestine	4,600	0	100
15	24	28.0 to 29.0° C.	0.01 to 0.2	gills	78,000	31	99
				gizzard	110,000	46	99
				intestine	4,600	0	100
16	24	29.0 to 30.0° C.	0.0 to 0.03	gills	61,000	250	99
				gizzard	24,000	0	100
				intestine	4,600	0	100

TABLE III (Cont.)

Bacterial Reduction During the Period of Purification

Lot No.	Treatment Time (hrs.)	Temperature of Water	Amt. of Chlorine in Water During Treatment as p.p.m.	Part Examined	Coliform Organisms Present: At Start M.P.N.	Coliform Organisms Present: After Treatment M.P.N.	Approximate Percentage Reduction
17	48	27.0 to 29.5° C.	0.06 to 0.9	gills	640,000	10	99
				gizzard	150,000	0	100
				intestine	11,000	0	100
18	48	28.5 to 30.0° C.	0.01 to 1.5	gills	64,000	0	100
				gizzard	240,000	0	100
				intestine	150,000	0	100
19	48	24.0 to 25.5° C.	0.09 to 0.5	gills	17,000	3	99
				gizzard	24,000	0	100
				intestine	4,600	0	100
20	48	24.0 to 26.0° C.	0.01 to 0.4	gills	150,000	15	99
				gizzard	15,000	0	100
				intestine	46	0	100

TABLE IV

Mortality Rate of Crabs During Treatment

Lot No.	Treatment Time (hrs.)	Temperature of Water	Amt. of Chlorine in Water During Treatment as p.p.m.	No. of Crabs Used	No. of Crabs Dead After Treatment
1	24	24 to 25.0° C.	0.01 to 0.10	42	2
2	24	24.5 to 25.5° C.	0.01 to 0.4	30	1
3	24	24.0 to 25.0° C.	0.0 to 0.1	42	12
4	24	24.75 to 25.25° C.	0.0 to 0.7	34	15
5	24	24.0 to 25.0° C.	0.01 to 1.0	37	11
6	24	24.0 to 25.0° C.	0.04 to 0.9	48	1
7	24	24.25 to 25.0° C.	0.04 to 0.1	36	0
8	24	24.25 to 25.0° C.	0.1 to 2.0	53	9
9	24	24.5 to 25.5° C.	0.1 to 1.5	48	3
10	24	24.25 to 25.0° C.	0.01 to 0.7	40	2
11	24	24.25 to 25.25° C.	0.07 to 0.45	55	5
12	24	24.25 to 25.25° C.	0.01 to 0.09	60	9
13	24	25.5 to 26.25° C.	0.1 to 0.25	47	9
14	24	27.0 to 29.0° C.	0.05 to 0.15	40	7
15	24	28.0 to 29.0° C.	0.01 to 0.2	42	16
16	24	29.0 to 30.0° C.	0.0 to 0.3	42	5
17	48	27.0 to 29.5° C.	0.06 to 0.9	42	5
18	48	28.5 to 30.0° C.	0.01 to 1.5	75	12
19	48	24.0 to 25.5° C.	0.09 to 0.5	81	5
20	48	24.0 to 26.0° C.	0.01 to 0.4	79	5
			Totals	973	134

treatment tank, therefore, was filled with water throughout the experiment.

After the treatment period had been completed 3 crabs were removed and examined in the laboratory. In making tests for fecal organisms the gills were removed from the crabs and combined. They were then cut up into small pieces

and 10 gm. were placed in 100 cc. of sterile dilution water. Ten cc., 1 cc. and 1/10 cc. portions of the dilution water (in using untreated crabs higher dilutions were used) were placed in lactose broth and incubated at 37°C. for 48 hrs. Confirmations were made on eosin-methylene blue agar. The same procedure was used for the gizzard-like proventriculus or pharynx and intestines of the crabs, excepting that when intestines were used it was not possible to obtain 10 gm. of the original material. In such cases the results obtained are based on the number of fecal organisms in 100 cc. of dilution water containing intestines of 3 crabs.

During the purification experiments the temperature of the treatment water was taken at hourly intervals. The number of crabs which failed to survive purification treatment was recorded in each case.

In determining the oxygen requirements of crabs (Table I) a number of these Crustacea were placed in the treatment tank and the tank was filled with sea water. Dissolved oxygen determinations were made on the water in the tank at the start of the experiment and at 15 minute intervals thereafter for a period of 1 hr.

EXPERIMENTAL DATA

The water used contained approximately 6.6 p.p.m. of dissolved oxygen per gallon. For purposes of calculation 6.6 p.p.m. can be considered as 24.95 mg. of dissolved oxygen per gallon. The number of gallons of water per hour required to keep the dissolved oxygen of the water constant during the purification treatment can, therefore, be determined.

In Table III the Most Probable Number of coliform organisms [3] are given as per 100 cc. of the original dilution water or per 10 gm. of gills or 10 gm. of gizzards. For intestines the figures represent the Most Probable Number of coliform organisms per 100 cc. of dilution water containing three intestines or per three intestines.

DISCUSSION

It is apparent that crabs require much more oxygen than oysters in order to carry out their physiological processes. According to Messer and Reece [4] oysters consume an average of 35 to 128 mg. of dissolved oxygen per bushel per hr. at temperatures ranging from 21.3°C. to 23.7°C. At somewhat higher temperatures (25.0°C. to 29.25°C.) crabs have been found to require from 240.10 to 271.16 mg. of dissolved oxygen per dozen per hr. A direct comparison between these two aquatic specimens cannot be made. However, it is evident that one bushel of crabs would consume much more oxygen than the same volume of oysters under identical conditions. This has a significant practical aspect since in practice a volume of sea water two or three times greater would me necessary for the treatment of crabs than that required for the purification of the same volume of oysters.

Unlike the oyster, the crab continues to pump water through its gill chambers even in the presence of 5 p.p.m. of chlorine. This has been demonstrated by placing colored solutions close to the water intake area of crabs (branchial clefts) held just under the surface of water containing 5 p.p.m. of chlorine. The colored solutions could be seen to flow from the water outlet clefts near the mouth.

The mortality rate of crabs during treatment was high, an average of 13.7 per cent. While there is no direct evidence that such is the case it is believed that the condition of the crabs when they arrived at the treatment station and the high temperature of the water during treatment were partly responsible for the high mortality rate. Chlorine, in the concentration used, appears to have no detrimental effect. The fact

that lobsters are floated commercially under similar conditions of pollution would indicate that such methods might be employed for other species of Crustacea.

The results of the purification experiments indicate that only rarely are all fecal organisms removed from the gills, pharynx, and intestines of grossly polluted crabs during treatment. On the other hand, a relatively large reduction of coliform organisms was obtained in almost every instance. It would appear to be more difficult to remove fecal organisms from gills than from the pharynx and intestines of crabs taken from areas known to be polluted. A factor which may be of significance in this respect is the fact that the contents of the pharynx and intestines are usually absorbed or excreted during the treatment period. The gills, on the other hand, often contain considerable sand and detritus even after a purification period of 48 hours duration.

It would be difficult to predict the commercial practicability of crab purification. Provided the temperature and time of cooking could be so decreased as a result of purification treatment to provide a sufficiently superior product and a sufficiently great increase in yield to offset the cost of purification, the process would be justified. It is believed, nevertheless, that in Massachusetts and in Canada where for commercial reasons other than purification it is the practice to float lobsters (*Homarus americanus*) the use of water containing a small residual of chlorine or previously treated with chlorine would have obviously beneficial effects. Lobsters are generally cooked in a weak saline solution. Ordinarily the cooking times and temperatures used are not sufficient to remove fecal organisms from lobsters when these organisms are present. Instead of floating lobsters in sea water containing fecal organisms, as is sometimes done, chlorine in small amounts might be added with little cost. This is especially true in those cases where lobsters are held in tanks containing salt water or sea water.

SUMMARY AND CONCLUSIONS

It is ordinarily not possible to remove all coliform organisms from crabs (*callinectes sapidus*) taken from polluted areas, by holding them in sea water containing no fecal organisms for periods of 24 to 48 hrs. duration. However, a very large percentage of the fecal organisms present in such crabs are removed during treatment.

Due to the fact that crabs require large amounts of oxygen, considerable quantities of sea water must be supplied during the purification treatment of such Crustacea.

A relatively large proportion of crabs died during the purification treatments. This is believed to be due to a combination of the high temperature of the water available and the condition of the crabs when they arrived at the State of Virginia experimental purification station.

A practical aspect would be the use of the purification method to reduce the boiling time for both crabs and lobsters where for any reason pressure cookers are not used.

One must realize, however, that once the crustacean meats are sterilized, unbelievably strict precautions must be exercised to prevent their recontamination.

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The National Health Program
*How Far? How Fast?**

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BEFORE attempting prophecy in any field it is important to define the character and limits of the area in which one is to do the crystal gazing. What is the national health program about which so much has been said and published within the past year? Even at the risk of repetition it is desirable to summarize briefly its outstanding features so as to avoid argument upon issues and facts not included therein. So much of the controversy about the national health program is concerned with problems only remotely related to it, although these collateral issues may have important social and political significance in other directions.

For purposes of the present discussion the following general assumptions appear non-debatable:

1. The health of the people is a matter of public concern.
2. Ill health is a major cause of suffering, economic loss, and dependency.
3. Good health is essential to the security and progress of the nation.

These assumptions appear to be axiomatic. If controversy rages around any one of the three it can only be because there is difference of opinion regarding the machinery necessary to correct the deficiencies. Certainly at this date no reasonable opposition may properly be raised to the three fundamental tenets stated above. Upon them rest the basic recommendations in the national health program confirmed in the general agreement reached at the National Health Conference in July, 1938. At that conference no one contested the fact that serious needs for medical service were unsupplied and that society had failed to make full application of available medical science to prevent or control disease and disability.

No one fails, of course, to derive great satisfaction from the increase in the average length of life in our country and from the improvement in the average levels of health and well-being. As the President of the United States has indicated, however, in his message to the Congress of January 23, 1939: "These improvements in the average are cold comfort to the millions of our people whose security in health and survival is still as limited as was that of the nation as a whole fifty years ago."

THE NEED

Statistical evidence of unfulfilled national health needs could be quoted here at length and perhaps even *ad nauseam*, because every published document has emphasized and re-

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emphasized in overwhelmingly convincing statistical data that essential resources for the prevention and care of sickness are lacking in many rural areas and are grossly inadequate in many smaller cities; that hospital services for persons with low incomes are insufficient in many cities; that, at the same time, hospital beds in private and semi-private rooms stand empty because patients are unable to pay the private rates, even in such tremendously wealthy cities as New York City; that in rural areas, general hospital and clinic services are either insufficient or wholly lacking; that government hospitals for tuberculosis and mental diseases are generally overcrowded and inadequately supported.

The statistical evidence would furthermore demonstrate, without reasonable contradiction, that among other specific ailments, tuberculosis, pneumonia, cancer, malaria, mental and nervous disorders, industrial injuries, and occupational diseases are far more prevalent or more deadly than they need to be.

We might go on to prove with more figures that maternity, infancy, and childhood are very inadequately protected, especially in rural areas, and that between one-half and two-thirds of maternal deaths, nearly one-half of stillbirths, and between one-third and one-half of the deaths among new-born infants are preventable. While we are seeking methods for prevention, largely administrative and financial in character, more than 70,000 lives a year are lost in this area of health service delinquency. These lives could be saved.

If your skepticism required further piling of statistical Ossa on Pelion, you should be reminded that on an average day of the year about 5 million persons are disabled by sickness and that about half of them remain permanently disabled. During the course of an average year sickness and disability cost the American people nearly 2 billion days' absence from work, school, or household duties. Those in the labor market lose annually by this sickness and disability over a billion dollars in unearned wages.

It may be reasonably concluded that the need for a national health program is clear. The history of health service in the United States shows with equal clarity that no rigid lines can be drawn between the services required for the prevention of disease and those essential for the care of the sick. In defining the objective of a national health program, therefore, one must assume that all areas in the country and all members of the population shall have the protection of adequate public health services and an opportunity to avail themselves, in accordance with their medical needs, of adequate care in sickness.

THE NATIONAL HEALTH PROGRAM

Paraphrasing the findings of the report on national health by the Interdepartmental Committee, one might say that in the United States we have patients without doctors, hospitals, and public health service; and doctors, hospitals, and public health service without patients. What is the program for correction? In its simplest terms it rests primarily upon the recommendations of the Interdepartmental Committee, discussed and confirmed at the National Health Conference held in Washington, D. C., July 18–20, 1938. These specific recommendations may be restated briefly as follows:

a. The expansion and strengthening of existing federal-state coöperative health programs under the Social Security Act, through more nearly adequate grants-in-aid to the states, and, through the states, to the localities.

If this recommendation were put into effect, it would require, at its peak, additional annual expenditures by fed-

eral, state, and local governments, of $365,000,000, or somewhat less than one cent per capita per day.

b. Grants-in-aid to the states for the construction, enlargement, and modernization of hospitals and related facilities where these are nonexistent or inadequate but are needed, including the construction of health and diagnostic centers in areas, especially rural or sparsely populated, inaccessible to hospitals. Grants toward operating costs during the first years of such newly developed institutions to assist the states and localities in taking over responsibilities.

Averaged over a 10 year period, the total annual cost of such a program, including special 3 year grants for maintenance of new institutions, is estimated at $147,400,000, or approximately 0.3 cent per capita per day.

c. Grants-in-aid to the states by the federal government to assist them in developing programs of medical care.

It is estimated that this part of the program could begin with the expenditure of $50,000,000 the first year with gradual expansion until the expenditure reaches the estimated level of $400,000,000 annually which would be needed to provide minimum care to the medically needy groups. At the peak this would involve approximately somewhat less than one cent per capita per day.

The maximum annual cost to federal, state, and local governments to implement financially recommendations (a), (b), and (c) is estimated at about $850,000,000 at the full level of operation within a 10 year period. In the 10th year, therefore, the average per capita per day cost for the people of the United States for the National Health Program would be less than 2 cents.

An additional recommendation made by the Interdepartmental Committee transcends perhaps in ultimate importance the three already noted. The committee, in making the recommendation, directs attention to the economic burden created by sickness for self-supporting persons. The committee emphasizes particularly that the costs of sickness are burdensome more because they fall unexpectedly and unevenly than because they are large in the aggregate for the nation or, on the average, for the individual family. The burdens of sickness costs can be greatly reduced through appropriate devices to distribute these costs among groups of people and over periods of time. In this particular field everyone is aware that the approach to the objective must be made slowly. Planning for a program of medical care sufficiently widespread to serve 130 million people would obviously require some years of development. It is probable that both public funds and private insurance contributions will ultimately find major places in the basic development of this particular undertaking. Here, too, the committee is in agreement with most observers that the rôle of the federal government should be principally that of giving financial and technical aid to the states in their own development of sound programs through machinery and financial plans largely of their own choice.

HOW FAR—HOW FAST?

The rate of implementing such a program as briefly outlined above rests, as Thomas Parran has recently pointed out, largely upon our future social concepts of which public health action is an integral part. Haggard has similarly suggested that "The physician fails to see that medicine itself is one of the institutions affected by the changes that are brought about (by medical science). Medicine does not stand alone; it is an integral part of society. . . . Public opinion determines the condition and future of medicine. . . .

The permanent basis of medicine is not its research, but its social application—its practice."

The speed with which the national health program is converted into action is contingent therefore upon how rapidly its objectives become clear to and are accepted by the lay and professional members of society. For the moment all of us are so concerned with the machinery of implementation that we have lost sight of the tremendous social sweep involved in the proposals. How far and how fast the program should move rests almost entirely with the desires of the people. Many misguided individuals have the belief that the program will rise or fall upon the support of opposition of this or that group of official or voluntary professionals. This is highly unlikely, because, in this as in every other important step forward in social progress, the public has dragged the professional groups with it in its march toward attaining the wider benefits of medical and public health service. The history of public health development in this country and in England discloses many confirmatory evidences of the fact that major steps forward in public assumption of responsibility for the prevention and cure of disease have generally resulted because of the demands of the people, in spite of the lethargy and meticulous attention to detail of the professional worker.

The question which now confronts your own and every other interested group in this country is whether or not we shall repeat the errors of lack of courage, of procrastination, and of resistance to sound and logical public demand which have marked the steps forward in every other country as well as in our own.

No one can escape the fact that the development of such a program as outlined is beset with dozens of administrative, financial, and psychological problems. These may be attacked and solved with timidity or with courage. Upon the nature of this attack will depend the answers as to how far and how fast the country may proceed.

The satisfactory development of the program will require the expenditure of large amounts of money, but it is money which is now spent in too great part inadequately, wastefully, and unintelligently. An essential of this program as in any other preventive program is the provision of adequate funds for research into the cause and cure of disease. To maintain the quality, scope, and amount of medical service essential for the successful operation of the program will place great strains upon the facilities for the education of physicians and other professional persons. Professional workers in the public health field will be needed in increasing numbers. Time must be permitted for their training and for their absorption into the administrative activities which will confront us in the future.

Notwithstanding these pressing and difficult problems, the need for correction should control the decision as to the speed of adoption of answers. We have always found a way to provide the machinery for improving the general level of health of our people as the necessities were demonstrated and as the scientific facts warranted. A prime requisite, however, for a successful search is a universal recognition of need. This universal recognition is still delayed.

A RISK AT PROPHECY

In reviewing these problems, one is always tempted to indulge in the dangerous art of prophecy, even while remembering Lowell's dictum in *The Biglow Papers:* "Don't never prophesy—onless ye know." The speaker hazards the following comments, however, assuming a high de-

gree of indulgence on the part of the audience.

1. Within 10 years the major elements of the national health program will be in effect, because the people want it, can pay for it, and are entitled to it.

2. The public health officer will play a major rôle in the evolution of the program, not always because he wants it, but because the forces of logic normally place the responsibility upon him.

3. Medical care will be universalized for the medically needy and for the lower income groups. It is probable that this universalization will proceed through the channels of tax-supported subsidies and voluntary insurance programs and ultimately toward a compulsory insurance scheme. This approach through experimental operations to compulsory health insurance will probably consume several decades, because in this as in all other efforts toward social amelioration, we must experience the same mistakes made elsewhere, before we learn to avoid them. These mistakes, contrary to the views of many, have considerable constructive value since they result in processes adjusted to the peculiarities of our own people and institutions.

4. In the fields of medical care and public health, equalization or levelling of necessary service independent of geography or economic status will occur as it has in universal education, postal service, transportation, public welfare, and other basic necessities for a safe and healthy society of people. Resistance to universalizing these services is doomed to fail as long as we preserve a true faith in democratic institutions.

Preliminary Observations on the Epidemiology of Mental Disease*

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THE application of the epidemiologic method to the study of diseases other than those caused by infectious agents has often been suggested. Some attempts have, in fact, been made to put these suggestions into practice but most of these attempts have been based on broad statistical studies rather than detailed investigations in the field. They have not been markedly fruitful.

The social and economic implications of the problem of mental disease are so tremendous and the limitations of study by the usual clinical methods are so strict, that an attempt to study the prevalence of mental disease in the field by the epidemiologic method seemed justifiable.

The Eastern Health District of Baltimore offers a favorable field for such a study. Its population of some 57,000 has been carefully studied over some 7 years, and unusually complete and detailed information as to its composition and characteristics is available. The presence within the district of a large psychiatric clinic with its active outpatient department, makes available a psychiatric service of the highest order, and the well organized health activities of the district maintain continuous and intimate contact with the population.

The study of mental disease in the district, made possible by a grant from the International Health Division of the Rockefeller Foundation, has been in progress for some 4 years. The fundamental purpose of the work is to study the prevalence of mental deviation in the field, by the methods usually spoken of as epidemiologic; that is, by a study of the cases with a view to isolating such differences as they may exhibit when compared with the population as a whole.

The difficulties have, of course, been considerable. No precedents are to be found in the literature for such a study, and technics have had to be worked out as the study progressed. Since the work covered both the work of psychiatry on the one hand, and of epidemiologic statistics on the other, personnel capable of working in the two fields had to be developed.

The object of the study, mental deviation in its broad sense, is by no means well defined either clinically or otherwise, and no reliable statistics are at present to be found other than those based on admissions to mental hospitals or to mental hygiene clinics. The first step was, naturally, to attempt to determine the true rates of prevalence of mental deviation, as a whole

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and by types, for the year 1933. This involved the collection of all available information regarding every discoverable case of frank psychosis which had been committed to a mental hospital or treated in a clinic, or otherwise come to attention, and regarding all persons who had in any manner exhibited recognizable evidence of mental deviation.

While this initial census cannot be regarded as complete, it brought together the names of, roughly, 3,900 persons who could be regarded as coming within the general scope of the study. This is 7 per cent of the total population of the district. In this gross total of 3,900 cases, were included about 1,300 adult delinquents of whom nothing is known other than the fact that they were arrested by the police for a wide variety of offences. Eliminating these from the total, there remained about 2,500 people, or 4½ per cent of the population, who seem proper objects of study.

The collection, tabulation, and analysis of the material regarding these 2,500 people have proved difficult and time consuming procedures. The cases have been classified by the psychiatric member of the staff according to broad "reaction types." Of these broad classifications, analysis of the cases of psychosis and of personality deviations is sufficiently advanced to give some idea, at least quantitatively, of the problem.

In the class of the psychotics are found 335 persons, a rate of 818 per 100,000 of the population 15 years of age and over. The white rate (875) is considerably in excess of that for Negroes (599). These figures represent the total number of residents of the district who were in 1933 to be classified as "psychotic."

First admissions correspond roughly with the incidence rates in other diseases. For 1933, this included 71 cases, or a rate of 175 per 100,000 population per annum. In first admissions the Negro rate is considerably higher than that of the white, 252 against 155, and the rate for males of both races is markedly higher (214) than that for females (139).

One striking fact is the marked difference in the incidence of psychosis between the two wards of the district. The two wards do not differ greatly in character or in the general composition of the population. Considering total prevalence, Ward 6, which occupies the southern half of the district, has a rate of 969 per 100,000 as against 679 for Ward 7. This difference holds for both whites and Negroes. The number of first admissions is so small for a single year that reliable detailed incidence rates cannot be calculated until the experience of a number of years is available.

The larger group of cases classified as general personality disorder, permits of more detailed analysis than does the relatively small group of psychotics. Such an analysis of this material, including 1,310 cases, has revealed many interesting and perhaps significant facts. Here again the southern ward (6) exhibits a far higher rate of prevalence than does the northern ward (7). The eastern sections of both wards show far higher rates than do the western. While a large part of this difference is due to the distribution of the Negro population, which is for the most part concentrated in the western end of the district, this factor does not explain all of the difference. In general, the rate of prevalence for the white population tends definitely to vary directly with the proportion of the Negro population living in the same area.

An interesting factor in the situation is presented by the Jewish populaton, which constitutes, roughly, slightly more than 9 per cent of the white population of the area. The Jews of the Eastern Health District present far

PERSONALITY DISORDER

Rates of Prevalence per 1,000 of Population for the Eastern Health District, By Color, Race, and Geographic Division

	Rates per 1,000 Population					
	Ward Six			Ward Seven		
Race	East	West	Total	East	West	Total
Whites:						
Jews	35.74	64.07	47.96	19.23	53.36	40.52
Non-Jews	16.16	27.37	17.68	10.40	13.16	10.77
Total White	18.90	43.52	23.64	10.52	18.63	11.76
Negroes	.....	28.27	.....	.....	21.69	.....
Total		36.46			20.82	

higher rates of personality deviation than do the remainder of the white population, and a large part of the difference in prevalence in the white population as between the two wards is due to concentration of Jews in Ward 6. This does not, however, account for all the differences, since the rate of prevalence in non-jews in Ward 6 is significantly higher than in Ward 7. The rate of prevalence of Jews in both wards is from three to four times as high as that of non-Jews. Similarly significant differences in rates of prevalence are exhibited when the two wards are divided into eastern and western sections. Both for Jews and non-Jews, the rates in the western sections are higher than those of the eastern.

Analysis has been made by size of household, showing significant increase in prevalence in both wards with increase in the size of the household. Analysis by economic status shows extraordinary differences. In Ward 6, homes of the lowest economic status have rates almost 6 times as high as do homes of the best classes, and the difference in Ward 7 is almost as great.

Even such simple analyses of the basic data as have been outlined, those of color, sex, race, geographic distribution and economic status, reveal important and sometimes striking differences in the prevalence within the district of certain forms of mental deviation. Of the significance of these differences, it is as yet too early even to speculate. The work already done indicates only that at the time of the first census these differences did exist. Subsequent work will show whether or not they are constant, and may make their interpretation possible.

Along with the analysis of the material collected for the year 1933, current information has been accumulated, and for the year 1936 a second census has been made. The analysis of this material should, when completed, answer some of the questions raised by the material here presented.

Integration of Health Department Records*

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DURING the first 6 years of its existence the Westchester County Department of Health accumulated more than 500,000 partially or fully completed medical and nursing record forms. Of these, approximately 175,000 were primary records, the remainder being duplicates, special summary forms, and index cards.

This heterogeneous mass of records was kept without reference to integration and according to the general scheme of having separate files for each unit of the department and for each specific service rendered. Thus, if the divisions of tuberculosis and nursing needed the same data regarding a case, the original record form was filed with the tuberculosis division and in addition a duplicate was made and filed with the division of public health nursing. Originals and duplicates in each division were generally filed according to residence of the individual they referred to. When some other method of classification seemed desirable, new sets of duplicates, or summary forms were made. Nearly every file had its own cross-index, separate and distinct from other similar indices. No one individual was responsible for devising forms, instructing field personnel as to filling them out, supervising files, or for the mechanical details of analyzing records collected. Each division director independently managed his own record system and directed the efforts of clerks assigned to him.

This uncontrolled hit or miss development led both to administrative difficulties and to inefficient service. The situation arose where nurses were spending as much as a quarter of their time making out and copying record forms. This proportion increased according to the whims and desires of division directors for additional information and the subsequent installation of more and more record forms. Records pertaining to a given individual could not be assembled from the department's numerous files without undue labor and expenditure of time, if at all. Correlated analysis and study of services rendered was virtually impossible.

Since conditions similar to these in Westchester County probably exist elsewhere, a progress report of efforts to develop a more efficient record keeping system is appropriate. Such a report is given in this paper, and is preceded by a brief description of the

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organization of the Westchester County Department of Health.

This department serves a population of 314,000, so distributed as to present widely varying problems. Most of the southern half of the district is suburban to New York City and is essentially metropolitan in character, while the northern half is sparsely populated and rural. The central office is located in White Plains, a city of 42,000. Under the Commissioner are two deputy commissioners. The department is organized in the following divisions—communicable disease, sanitation, tuberculosis, pediatrics, public health nursing, syphilis, and statistics.

Although the work is for the most part administered from headquarters, clinic and nursing services are decentralized. The 24 field nurses work out of four district centers, each of which is directed by a supervising nurse and staffed with clerical personnel. Within each district are from six to eight substations. Some of these are used only for clinic sessions, and others both for clinics and the holding of office hours by nurses.

The director of the statistical division has been given general supervision of the majority of headquarters and field records, excepting those of the division of sanitation. The content of record forms and the kind of information desired are decided upon in coöperation with the various administrators and specialists concerned. However, the statistical division is alone responsible for the manner in which data are obtained, and made available for routine use or special analysis.

Three fundamental record units have been established in accordance with the organization scheme of the department. The field unit comprises files of active family folders kept in the four district offices. The headquarters unit is a series of case registers, one for each medical service. The third unit is an essential correlating agency—a single master index located in the central office. This index cross files alphabetically all other files of the department and shows where each record for a specific individual may be located. Field records are moved after each use to the central office where clerks enter appropriate information in the case registers and index before returning them to field offices. A detailed description of each of these record units follows.

FAMILY FOLDER FILES

The family folder has been selected as the most logical and flexible unit for field files. There is a series of alphabetical files of family folders in the district nursing centers, one for each sub-center included in the district area. This single unit replaces and consolidates a former file of nursing records arranged by families, and files of medical records, arranged first by services and by individual within service. The new family folder contains the following records.

1. A family history to be used by medical and nursing services
2. Medical and clinic records for members of the household
3. Records of nurses' home visits

Incorporated in the social history sheet are a household roster and a service summary. The household roster shows for each individual, name, date of birth, sex, color, relation to head of household, date of entrance into the household, occupation, and a general description of health status. The service summary lists the members of the household carried at any time on active clinic or home visiting lists, the specific services rendered with date of admission and space for date of discharge and reason.

Medical records, so far as possible, conform schematically to one pattern in order that whoever uses them may know

the approximate location on the form of the information desired. The face sheet for each medical service contains identifying information, a medical history, and the findings of the first examination. Its reverse side and the second sheets are simple continuation forms. There is a minimum of duplication on the medical records of information already given on the social data sheet.

A form for noting the results of nurses' home visits is in experimental use. Nursing record forms in common use have been abandoned and in their place has been substituted a ruled sheet with a column at the left for a date and the name of the person to whom the notes refer. The nursing record thus becomes a chronological narrative for the entire household roughly indexed by date and individuals. Such a form is made possible by keeping histories in the same folder.

To facilitate handling what in some instances is a rather large volume of records, a special type of folder is being installed with attachments for holding records in place, as well as separate sub-divisions for segregating the various classes of records. The filing edge of the folder bears a label showing the name of the head of the household and address. Labels banded with a color, each color representing a single service, serve as signals for household counts. Figures on the labels indicating the number of individuals receiving that service are signals to be used in individual counts.

Records for discharged cases are removed from the family folder and kept in a central discharge file for the entire health district, but the fact that an individual in the household has been discharged from a service is noted on the service summary.

The folder is taken by the nurse into the field when she is making home visits; it is used by the physicians and nurses in clinics. The folder is sent to headquarters after a clinic visit for necessary interpretation of new data by physicians and for register entry and indexing by clerks. It is held there no longer than 24 or 48 hours before being returned to the field. After a nursing visit, the folder is given to the clerks in the district offices who forward necessary data to the central office for register entry and tabulation.

The advantages gained from this type of field record are these: The number of forms in use has been reduced by at least one-third. As far as possible, records serving the same general functions have the same form and follow the same field and office routine. There is little or no duplication of information on the different types of field records. The field worker, doctor, or nurse writes one and only one set of observations concerning a case. These observations are available without copying or summarizing to other persons who need them.

CASE REGISTERS

Case registers are sets of files in the headquarters office designed to serve two functions. They are used by division directors and others for case reference and are the source of data for routine reports and special studies. Formerly files of duplicate field records served the first of these purposes, and a set of summary records were used for the second. The case registration card is an expansion of the summary form to include data required for case reference. These data, however, are entered in coded or abbreviated form. As a result the card is small enough to be manipulated easily in tabulation, and the information is in suitable form for statistical classification. Visible files of 4 x 6″ cards with significant facts coded on the filing edge have proved very useful in adapting reference files to statistical use.

A series of case registers, one for each health department activity, is maintained in the central office. The individual card shows the type of observation required, the care, treatment, and follow-up service given by members of the department staff, and the results of such service together with significant dates. There are separate case rosters for each clinic service (tuberculosis, syphilis, infant and child hygiene, orthopedics, etc.), and each registers all persons who are or should be receiving care or observation from that service. The files of birth and death certificates, reported cases of communicable diseases, and a file showing the immunity status of preschool children with respect to the more important acute communicable diseases, are case rosters essentially since they register individuals who require certain types of health department supervision. By filing with them additional data regarding follow-up service, they become similar in content and function to other case registers.

In general, direct reports to the health department are noted in the registers before being passed on to the field representatives concerned and, conversely, field records after each use are sent through them for entry of new data by clerks. They are, therefore, always up to date. They impose no clerical work on field personnel. Correlated medical and nursing data are available for health appraisal, and can be amplified for special studies without creating additional field forms or disturbing the routine of field records.

MASTER INDEX

With the wide diversity and constant flow of records, it is essential to establish an integrating agency to locate all forms pertaining to a given individual, indicate where entries of new information should be made, and facilitate transfers from one file to another. The agency selected for the Westchester County system is a master index with a card for each individual who has permanent records on file. The card shows, in addition to identifying information, the exact location of the records relating to the individual. The index cross-files registers (including birth and death certificates), active and inactive files of field records, and other miscellaneous files of the department, such as X-ray films and laboratory reports. Each record is checked with this file before being used in any other office or field procedure. The use of symbols to indicate types of records makes it possible to use a small card. A visible soundex file, such as the one installed in Westchester County where 85,000 individuals are indexed, decreases greatly the time required in looking for names.

The index has already proved to be extremely valuable in a number of ways. Other files may be arranged in some way except alphabetically when desirable. The clerical staff can locate quickly the records requiring entries of new information. It acts as an automatic device for coördinating information on file, and, therefore, substitutes one checking operation for many. For example, death certificates are checked with registers of tuberculosis and syphilis cases, with birth certificates and nurses' active cases in one simple operation. It serves as a clearing agency for changes of address, a very important function in a county such as Westchester where the rate of migration is very high.

The maintenance of this record system does not require a larger clerical force than did the original unplanned one. The transfer from the old to the new system has, of course, necessitated additional temporary clerical personnel, and 8 clerks were supplied through a WPA project for an 18 month period. Now the force is practically the same

as under the old system and is producing better data and giving better service than previously. In all fairness, however, it should be pointed out that the deficiencies of a poor system increase geometrically with the number of records involved. Possibly small county health units may not waste as much time and effort through bad record practices as does a large unit like that in Westchester County. If this is true, suitable modifications in the system might be made in applying it to small organizations.

SUMMARY

The record plan described herein emerged after considerable trial and error, from attempts to decrease the amount of record work required of field personnel, and to put data already accumulated in such form that they could be located and used. It has these salient characteristics: The household is recognized as the primary unit of field service and a household folder of records is designated as the place to record basic data. The folder is kept permanently in the hands of the persons who use it most, namely the field personnel. Movement of the primary record to persons who require it replaces numerous special report forms and duplicates filled out by field personnel. One set of secondary records for reference and analysis, kept at headquarters and handled by trained clerks, takes the place of office duplicates and statistical summary cards. An integrating and correlating agency is created through which all new data must pass before they are permanently filed.

Industrial Medical Department Organization*

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RECENTLY, considerable attention has been directed toward industrial medical organizations in large corporations. Industrial corporations employing approximately 25,000 workers or more have designed medical departments well staffed with physicians, nurses, and technicians, which have sponsored the development of industrial hygiene laboratories and have developed integrated coöperation with numerous other departments usually found in large scale industrial operations such as safety engineering, plant engineering, material specifications, group insurance, legal and compensation departments.

While this progress has been very logical and commendable, it is significant that of all this nation's workers, relatively few are benefitted by such large medical organizations. In fact, 99.5 per cent of all of the industries employ less than 1,000 workers each, and 98.6 per cent have less than 500 workers. Out of 8,838,743 so employed, only 2,159,989 are to be found working in larger establishments employing over 1,000 men. This leaves 6,678,754 workers in the smaller establishments. These figures were taken from the federal census material of 1930, and are limited to establishments reporting annual products valued at $5,000 or more.

The medical organization of a large industrial corporation can and should be very complete. In such a department, the medical director is a thoroughly qualified physician having complete authority and control over all medical activities of the organization. The department includes physicians qualified in traumatic surgery and industrial medicine, ably assisted by a staff of industrial nurses, clerks, and ambulance drivers.

These industrial nurses ordinarily should be limited in their functions to the treatment of minor abrasions, lacerations, contusions, and other minor miscellaneous injuries. The nurse also undertakes certain treatments, does some of the redressings, and at times clerical work. All of her work is under the direct supervision of a full-time physician. For duty during the night hours, male nurses are often preferred in certain cases.

Available to these physicians and closely correlated with their work, there should be an industrial hygiene laboratory capable of routine analyses and field surveys relating to industrial health hazards and leading to the elimination or control of such hazards. It is necessary for such an industrial hygiene

* Read at a Joint Session of the Industrial Hygiene and Public Health Nursing Sections of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938.

laboratory to be organized on the basis of properly qualified personnel including such physicians, chemists, and engineers as may be necessary to deal with the particular health hazards in any given corporation. Where such problems exist, the laboratory must be prepared to employ methods for sampling and analyzing various dusts, smokes, fumes, vapors, mists, or irritating substances. The industrial hygiene laboratory also maintains an adequate reference library; it is interested in toxicological problems, and must have contacts with local public health agencies. The industrial hygiene laboratory must be in a position to observe its corporation's compliance with public health rules and laws.

Complete coördination between the medical department and the employment department, production supervision, group insurance, safety engineering, plant engineering, and plant management, is indispensable.

However, it has been indicated already that a significant majority of the nation's workers do not fall into the classification of large scale industrial employment. This majority is employed by thousands of small manufacturers. How, then, is a complete medical service such as outlined possible to this large group of workers?

Most of these smaller plants do not operate on a sufficiently large scale to warrant the employment of a full-time physician. For some it would not appear possible to employ the full-time services of an industrial nurse. In the face of this apparent difficulty, it is none the less true that herein lies the greatest opportunity for the nurse of today who is interested in industrial nursing.

Present opportunities in industrial nursing can best be explained by discussing the qualifications of an industrial nurse, including special capabilities necessary for industrial nursing in contrast to other forms of nursing, and certain other qualifications which will enable her to adapt herself to the particular needs of manufacturers employing labor on a small scale.

Naturally, certain attributes such as neatness, character, and pleasing personality, along with academic attainments such as graduation from the best type of nursing school, are essential. Innate enthusiasm and interest in workers of all classes are no less important in small industries than in large plants. In the smallest industrial units, where there is no provision for attendance by a physician, the industrial nurse must be able to assume certain additional responsibilities. She should also have that rare ability to carry out certain administrative functions in a friendly manner, yet ever maintaining the dignity of her profession.

The industrial nurse must have more than these admirable qualities to fit into a small scale industry. She must be able to understand problems of management and supervision as well as those of wage earners, and in some instances act as an adviser in promoting mutual understanding between these groups. Her position in this aspect of promoting a fine employee-employer relationship is unique indeed.

While it is usually recognized that all industrial nurses are carrying out at least a type of public health nursing, the nurse in a small plant, where physicians are not employed, has an even greater need of ability in public health problems. She must be familiar with local laws and rules pertaining to public health problems and should understand the entire local program of public health agencies.

In addition to having part-time medical service, or perhaps no regular medical service, the smaller industrial unit seldom has any industrial hygiene laboratory facilities unless such are

provided by an insurance carrier. Even in the latter case the industrial hygiene coverage is prone to be scant. Therefore, it is necessary for the industrial nurse of this type to familiarize herself with many of the rudiments of that science which is now called "industrial hygiene."

Industrial hygiene perhaps partakes of the engineering, chemical, and medical professions, but is rapidly being recognized as an entity apart from these professions. It is not visualized that the average industrial nurse of this type will become an expert industrial hygienist. It is hoped that the nurse will recognize her limitations in this field and seek proper consultation in the same manner as she has been taught to do in cases of illness or injury. However, where the volume of nursing and actual first aid work is small, she must necessarily sell herself to her prospective employer on the basis of added functions, and this is one of them.

Ordinarily, any plant, however small, lists among its manufacturing operations several potential sources of occupational disease. These should be appraised and studied in particular so that the nurse may advise the management or supervision in regard to the common health problems of her plant.

In the initial appraisal of health hazards in any particular plant, it is hoped that she may be aided by some form of industrial hygiene coverage such as that furnished by many insurance carriers. This may serve to designate the outstanding health problems sufficiently so that the nurse may develop more detailed knowledge regarding these few hazards by directed reading in the literature, and contacts with physicians and scientific meetings. In Michigan last year there was formed a new society known as the Michigan Society of Industrial Hygiene whose membership is open to all persons interested in or doing any phase of industrial hygiene. Particular attention is given to the problems of those doing work in smaller plants.

In many of the smaller industrial units the combined work embraced under the titles "first aid" and "industrial hygiene" may not be sufficient to warrant the employment of full-time nursing service. Therefore, in order that the nursing profession may fill this potential professional market more successfully, it should whenever possible present other qualifications such as stenography, filing, and kindred office work.

One finds it interesting to note the number of nurses who now are supplementing their professional abilities with studies in stenography and various other office routines to make themselves more valuable office assistants to physicians. Nurses who have this training can make themselves invaluable to smaller industries in the dual rôle of nurse and office worker; and, depending on their ability, can handle the personnel work for these plants in a very satisfactory manner; also, in some cases, they may increase the value of their services, where the volume of work already indicated is sufficiently small, by various other types of nursing—visiting services or social services where mutual aid or mutual insurance societies exist.

When the establishment of a medical department in a small plant is contemplated, and it is planned to utilize the services of the type of industrial nurse described herein, one initial step is advisable. In all these instances, the plant management or the insurance carrier usually has selected a nearby physician for reference in cases of compensable diseases and injuries. The nurse should consult freely with this physician and elicit his aid in the establishment of standing orders and routine treatments.

Now, it will readily be seen that, should any of these activities individ-

ually consume very much time, such a scope as outlined would be impossible. But in the smallest types of industrial units, it is preferable and will lead to greater efficiency when the industrial nurse recognizes all of the possible ramifications of her position so that she may be better prepared and better qualified in each of these aspects rather than allowing them to be handled in a haphazard manner as problems in these different classifications arise.

Proper study and training directed along these lines will certainly help industrial nurses to make a place for themselves in small industries.

Relationship of Doctor and Patient

THE profession of medicine is one of the most individualistic of all professions. The relationship between doctor and patient is a highly individual relationship, with something of a religious character, even though the doctor has long ceased to be actually a member of the priesthood as he was in earlier times. In a country such as ours it is a very good working rule—and indeed it is more than that: it is a fundamental principle—that individual enterprise should not be interfered with by the State unless that enterprise is either injurious to others or to the community, or is failing to deliver the goods or services which the community requires. I think this principle is generally observed in the relations between the general practitioner and the State. The State or municipality can lend organizing power, and it can supplement the work of the individual by making available facilities which the individual could not provide for himself or by creating conditions in which the individual can make a more effective contribution to the common good. But the State is not, as is sometimes supposed, a bureaucratic machine trying to bring everything under its control because of a blind worship of the Unknown God of tidiness, and, although it is sometimes accused of adding every year to the number of things in Acts of Parliament which are subject to the approval of the Minister of Health, much of the time and energy of Ministers and their Departments is in fact spent in resisting the acceptance of such control or jurisdiction because it is clear that the public interest, which must be paramount, does not require it.—Health and the State, Walter Elliot, *Brit.M.J.*, Feb. 25, 1939, p. 4077.

Practical Procedures and Limitations in Present-Day Smoke Abatement*

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NO individual was more closely in touch with smoke abatement problems than the late O. P. Hood, who was chief mechanical engineer of the U. S. Bureau of Mines; and no one had a better understanding of the difficulties involved. Asked why smoke abatement efforts do not bring more satisfactory results, he once said:

> The main reason is an incorrect estimate of the kind and size of the job. When an industrial community realizes that keeping the air clean is a project of similar magnitude to keeping streets clean, providing clean water, removing city waste, or guarding the moral atmosphere, then there may be a real hope of success. We usually think of the project in too small terms. It is thought of as the dog catcher or the boiler inspector—a matter of a man or two, a job or two, a small appropriation of variable and uncertain amount, to be abolished in a fit of economy and reëstablished under pressure of a vigorous minority. Even so, it is surprising how much is obtained for the effort; but the community is rarely satisfied, for the job is bigger than it was conceived to be . . .

This is a clear statement with which I believe all engaged actively in smoke abatement enforcement will agree. Misconception of the magnitude of the problem is reflected in governing ordinances and budgets which are mainly responsible for today's limitations.

* Read before the Public Health Engineering Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 27, 1938.

THE ANTI-SMOKE ORDINANCE

Most of the anti-smoke laws now in effect are the outgrowth of ordinances written twenty or more years ago, when fuel-burning equipment was less efficient from the standpoint of smoke abatement, and when processed fuels were not as common as now, and when we knew a lot less about the subject in general.

These outmoded ordinances were prepared in the light of conditions that since have improved in many respects, not the least of which is the change in the spirit of antagonism toward regulation.

Now, as then, atmospheric contaminants come from many sources, but in an urban atmosphere, are mostly products of fuel combustion. Products of combustion are solid, liquid, or gaseous; some are visible to the eye and some are not. The visible was tangible, so the finger of accusation was levelled at "visible smoke." If it could be suppressed, it was thought the cause of general complaint would be removed. But it appeared that, for one good reason or another, it would be too drastic to prohibit the emission of all visible smoke in a soft coal burning community. Thus it was agreed that the prohibition should not extend beyond "dense" smoke—smoke that is opaque as it leaves the stack.

But, again, it was felt that this would be too severe, so it was decided that dense smoke should be permitted for a specified limited period. No time limit was placed on "light" smoke. Cinders, ash, and sulfur gases were not mentioned—not because they were unrecognized as objectionable, but because at that time control was considered impracticable. Private dwellings and small apartment houses were made exempt as inviting too much trouble under the conditions then existing; in other words, regulation covered considerably less than 10 per cent of the total number of stacks in the city.

There you have the limits of the ordinance of ten or twenty years ago. How do they compare with those in effect today?

The *Manual of Ordinances and Requirements,* published in August of this year by the Smoke Prevention Association, analyzes ordinances of 77 cities in the United States and 3 in Canada, ranging in population from 37,000 to 7,434,000. One city is listed as permitting no dense smoke; 16 apparently limit the emission of dense smoke to periods of cleaning or building new fires (cleaning fires is a time-worn excuse); the remainder allow certain other specified periods of dense smoke. And some of the later ordinances include regulation of private homes and small apartment houses, apparently on the same basis as industrial and commercial plants.

Some progress, therefore, would seem to have been made—at least on paper. But the plant operator still can say, if he wishes, "Catch me." And further, firemen could, if they would, cause a tremendous aggregate of smoke of "permissible density." Fortunately they are not so inclined.

THE ENFORCEMENT STAFF

Since knowledge of conditions still is dependent upon observations by smoke inspectors—in other words, direct reading and timing—the number of violations recorded will be proportional to the number of inspectors or observers. Forty-five of the 80 cities included in the report made by the Smoke Prevention Association have no full-time employees on smoke abatement. Most of them list one or more part-time—boiler inspectors or sanitary inspectors. Nineteen more have only one man. In the larger cities, while there are more full-time employees, the ratio of employees to population is low. For example, in Hudson County, N. J., and in St. Louis, Mo., the ratio is 1 to 66,000 persons; in Chicago, Ill., it is 1 to 80,000; in Washington, D. C., it is 1 to 105,000; and in Pittsburgh, Pa., the ratio is 1 to 175,000.

THE BUDGET

Annual budgets for enforcement of anti-smoke ordinances are, as Dr. Hood said, small, variable, and uncertain. St. Louis, with its new ordinance, is at the moment at the top among cities with more than 500,000 population, with an appropriation equivalent to nearly 5 cents per capita. Hudson County is next with 4 cents per capita. Then come, in order, Chicago and Washington with about 2½ cents each; Boston and Pittsburgh, each with a little less than 2 cents; Cleveland and Baltimore with 1 cent each; and Detroit with 6/10 cent.

Obviously, with such small enforcement staffs and meager budgets, anything like real supervision is impossible. As a matter of fact, the records of a bureau under such handicaps give an erroneous idea of actual conditions.

It has been possible, during the last several years, to make good use of WPA funds to secure a great deal more information than could be gotten routinely. Here is a part of the results obtained in Pittsburgh with a corps of

50 WPA observers as compared with those of the three city inspectors.

Pittsburgh has about 5,000 stacks regulated by the anti-smoke ordinance. In the exempt class there are 154,000 dwelling units, in 114,000 of which solid fuel is used. The city was divided into 50 districts and a WPA observer, after being taught to differentiate between dense smoke, medium smoke, and light smoke, was assigned to each district. He averaged 120 hours of work per month, and during about two-thirds of the time was on duty from 7 A.M. to 1 P.M., on Mondays to Fridays, and the remainder of the time his shift was from 12 M. to 6 P.M. He was expected to report time, character of building, density and duration of smoke. While even with 50 observers only a percentage of the total number of stacks was under observation at any time, the vastly closer supervision was by comparison much better than an arithmetic ratio. A summary is given in Table I for the month of March, 1938. During that month the three city smoke inspectors reported 62 violations on all classes of stacks except domestic, which are exempt from regulation.

PRODUCTS OF COMBUSTION OTHER THAN VISIBLE SMOKE

Thirty-nine of the 80 cities previously referred to have some sort of provision against excessive fly ash, fumes and/or noxious gases. Of this number, 8 apparently have regulations to cover fly ash at least; 6 require screens at the top of the stack, probably intended for rubbish incinerators; the rest either do not specify, or they say there is no provision for enforcement.

Dust separating equipment is readily available for large and medium size plants, but these in number are a small percentage of the total. Something inexpensive and relatively efficient must be developed for the myriad of small plants. As regards sulfur compounds, there is at present no practicable method of elimination except for the largest plants. Other gases and fumes from industrial processes present other problems.

Standards of permissible dustiness or permissible noxious or obnoxious gas content of stack gases are lacking, although this problem is receiving serious study. There is also the technical and time-consuming task of sampling and analysis to determine compliance or violation which, obviously, cannot be done by smoke abatement bureaus as today constituted and manned.

PRACTICAL PROCEDURES

Requirement No. 1 for whatever success is possible, is coöperation between the bureau and the various groups with which it must deal—Coöperation with a capital "C." These groups include (1) the owners and operators of fuel burning plants, from the power plant having boilers rated in thousands of horsepower to the boiler or furnace which supplies heat for a small space; (2) manufacturers and salesmen of equipment—furnaces, boilers, stokers; (3) producers and distributors of fuel; (4) architects and engineers concerned with design and installation of plants;

TABLE I

Number of "Smokes" Reported by 50 WPA Observers

	Heavy Industries	*Light Industries*	*Commercial and Heating Plants*	*Domestic*
Light Smoke	586	2,215	9,590	83,698
Medium Smoke	596	1,601	5,771	28,478
Dense Smoke	436	1,263	4,299	15,317

and (5) civic bodies, the press, and the general public.

CODE OF REGULATIONS

The bureau has rules and regulations to guide those selling, or those purchasing, installing, and using fuel burning equipment. These rules and regulations are limited legally by the limits set in the ordinance. The enforcement officer will of course see that new installations and those receiving major repairs conform to those requirements.

In formulating a code, there are some excellent guides. Much of the material can be taken as prepared by national organizations, or as used in comparable cities; much can be taken from commercial catalogs. However, attention must always be given to local factors, peculiar to any community, as wind velocity, topography, fuels commonly used, etc. These may make it advisable to increase the requirements for a particular city, or even for a part of that city.

Proper capacity—boiler, firebox and combustion chamber, stoker, breeching, stack—and appropriate fuel must be insisted upon from the standpoint of operation in conformity with the ordinance. A sense of false economy may and often does prompt the purchase of equipment which, while it may give the necessary output, must over a large part of the time be forced, resulting in an excess of smoke.

Allowable output, stoker setting heights, and stack sizes will be subjects of occasional argument, where the city's requirements differ from catalog recommendations. On the other hand, the enforcement officer knows whether there are local conditions that influenced him in setting up his standards. Aside from such local conditions, those standards are, or should be set up on the basis of consideration of the type of operation to be expected, rather than what can be done in a supervised test. Then, too, the enforcement officer cannot differentiate between makes of the same type of equipment, if all can meet his requirements in normal operation.

FIELD OBSERVATION AND INSPECTION

Since it is physically impossible for the present small number of inspectors to keep in desirably close touch with all plants, there develops a differential treatment. Some plants need frequent attention, others require very little. During the heating season the work of the bureau is multiplied. Hand-fired heating plants and many heating plants that are stokered require closer supervision than do most high-pressure installations. A large percentage of the firemen in medium size and small heating plants have other duties to perform. Fires are not given proper attention, and many such firemen know too little about firing a boiler, or furnace. Result, much too much smoke.

An important part of the field work is the handling of complaints. Some of these have real bases and the bureau is glad to have this outside assistance. Many complaints, however, are about cinder and ash rather than visible smoke; some are against odors; while many are the result of personal animus against neighbors. But, some of the complaints are justified, therefore all must be investigated.

COÖPERATION THE MOST IMPORTANT FACTOR

To return to the matter of coöperation, without which the enforcement of an anti-smoke ordinance would be extremely difficult, if not impossible.

Owners and Operators—Members of this group are, on the whole, very coöperative. They are willing to do what the city bureau requires, although at times it involves spending more than was anticipated for a new plant, replacing grates with stokers, or for

changing fuel. Of course there are inevitable exceptions where argument or even an ultimatum may be necessary, but such cases are relatively few.

Equipment Manufacturers and Salesmen—The city's requirements must, of course, be made known to the members of this group, and only borderline cases need to be discussed. The enforcement officer must not play favorites; and if a concession is asked for and made in a particular difficult case, all bidders on that job should be notified and allowed the same concession. In every way, all who are making or selling approved equipment must be treated alike. There will then be no question about coöperation.

Producers and Distributors of Fuel—It is important that the enforcement officer have a knowledge of the fuel situation, particularly with reference to processed fuels. Many distributors maintain corps of engineers who will work with the city bureau in solving difficult or aggravating problems that involve determination of the best type or grade of fuel for particular plants.

Architects and Engineers—These are concerned mostly with new buildings and plants. Obviously, the possibility of trouble can be avoided if the bureau of smoke regulation passes upon plans before the building permit is issued, so that proper boiler room arrangement and stack may be assured. I believe this is now the general practice and is welcomed by the architects and engineers.

Civic Bodies—Chambers of commerce and civic clubs usually have smoke abatement committees and endeavor to aid the enforcement officer in his task. The bureau should be represented on all such committees, so that committeemen may be kept informed.

The Press—The local newspapers are keenly interested in air pollution. They can be, and usually are, a powerful factor in keeping the subject in its proper light before the public. This is especially true during the occasional periods in the fall and winter when, in moist air and with little or no wind, the people are sniffling, sneezing, and coughing in the smog.

The General Public—The apathy of the public toward this important matter of air purification is the principal reason progress has not been more rapid and more complete. In each community there is a small minority of interested persons, but the average individual pays no attention unless a neighbor showers him with soot, or until his city has a two or three day smog. He is then vociferous and wants immediate and drastic action. Usually the blame for smoke is laid at the doors of industry—the mills and the railroads. It is true that an increasing number of householders are asking what to do in their own homes, but the increase is too slow to be of early benefit in changing conditions in a city.

It might be of interest here to say that, last spring, 100,000 copies of a questionnaire titled "Smog and You," were sent out by the Pittsburgh Department of Public Health, acting in coöperation with the Allegheny County Medical Society, Air Hygiene Foundation, Mellon Institute, and other scientific organizations. In reply to one of the many questions: "How do you feel during 'smoggy' days?" 53 per cent of those answering reported stuffed-up nose; 62 per cent had a rawness or a tickling in the throat; 25 per cent increased coughing; 22 per cent increased sinus trouble; and 9 per cent reported feeling "as usual."

CAN SUCCESS BE ATTAINED?

I have stated briefly some of the limitations of present-day smoke abatement, and indicated sketchily what is involved in enforcement of an anti-smoke ordinance.

The question that arises naturally,

though not included in the title of this paper, is: "What can be done about it?" My answer is that it is now possible, from an engineering standpoint, to provide means for a marked advance in the prevention of air pollution. Any urban community can secure the benefits of hygienically pure and relatively nuisance-free air if and when it wants it and each individual is willing to assume his very small part of the burden.

Without a detailed discussion, I should like to close with the following statements:

Ordinances specify limits for smoke, Fuel-burning equipment need not now be designed to do more than meet those limits although much of it does.

While current regulations must be made in consideration of equipment and fuels currently available, there is no reason against the formulation of ordinances that shall be progressively stringent, with limits narrowing at specified future dates. The engineering profession is accustomed to meeting such challenges.

In considering conditions in a city, the fuel burning plants may be divided into three major groups (we are not here considering industrial dusts, fumes and gases, nor air hygiene as it is affected by pollutants other than those from the combustion of fuel):

1. Large plants having continuous engineering supervision and operated according to best practice can and usually do work well below prescribed smoke limits. Such plants could and would meet requirements more stringent than are now in effect in most cities.

2. An intermediate group includes smaller industrial and commercial plants, institutions, and the heating plants other than those in private homes and small apartment buildings. Many of these are stokered, a large percentage of the stokers being of the intermittently operating type; many are fired by hand. The human element is a large factor. Many of the firemen are inexpert, and many have other duties than the care of the boiler plant.

3. The domestic heating plant fired, improperly more often than not, by the householder, the housewife, or the maid, is the most troublesome because of the great number, and because of the impracticability of education en masse.

If and when a community wants cleaner air and is willing to assume the obligation involved, a radical change in the ordinance might confidently place more restrictive limits on group 1. As to groups 2 and 3, it is my opinion that adequate results will be secured only if the ordinance restricts the use of potentially smoky fuel to equipment that will burn such fuel smokelessly under the ordinary conditions of operation; and, where the plant—be it industrial, commercial or domestic—is not so equipped, requires the use of a fuel that cannot smoke.

Use of Agar Slants in Determining the Sanitary Quality of Milk*

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THE growing tendency among those interested in determining the sanitary quality of milk to place more emphasis on relative rather than actual numbers of bacteria present gradually places new interpretations on older methods of enumerating bacteria. Methods which do not meet the requirements of accuracy in so far as counts are concerned become of importance if they are of value in making comparative determinations of the number of bacteria present. One of the most important methods of this type is the smear culture method commonly referred to as the Burri agar slant procedure.

It is not the object of this discussion to present the agar slope method as a new or particularly accurate method for determining the number of bacteria in milk but rather to emphasize its value as a method of determining the relative numbers of bacteria in samples of milk as well as its use for the control of certain plant procedures in processing milk and dairy products.

HISTORY

The agar slope method was originally described by Burri [1] as a method of enumerating bacteria in milk. The inaccuracies of the method as a counting procedure were soon recognized, and the method has failed to gain wide recognition as a counting method in comparison with the direct microscopic and Petri plate procedures. Later, Dorner [2] used the agar slope procedure in determining the number of bacteria present in freshly drawn samples of milk and reported it as most useful under such conditions. He also found that the agar slope method gave higher counts than the more commonly used standard Petri plate procedure. Several other investigators have used the Burri slant procedure [3, 4] in various investigations, more particularly mastitis and milk plant studies. Recently Long and Hammer [5] have presented results which indicate that the Burri slant procedure has value as a means of determining the number of organisms in various parts of masses of butter.

TECHNIC

The procedure which was originally described by Burri has not been changed materially during the period since it was first described. It consists of the preparation of the agar slopes of any

* Read before the Laboratory Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 28, 1938. Approved by the Director of the New York State Agricultural Experiment Station for publication as Journal Paper No. 308, January 10, 1939.

desired composition with the provision that 2 per cent of agar be used in order that the agar may be sufficiently firm to allow surface streaking. Each tube is filled with from 6 to 8 cc. of the agar and inclined to obtain a slant about 3 inches in length. Before use, the tubes are allowed to remain for a sufficient time in a horizontal position to dry the surface of the agar thoroughly.

A standardized loop is used for measuring the amount of milk which is to be transferred to the surface of the slant. This loop is made of platinum wire 0.3 mm. in diameter and the loop so constructed as to be 1 mm. in diameter. This loop will transfer approximately .001 cc. of milk.

The loop of milk taken from the sample to be tested is touched lightly at various points from the bottom of the slant to the top, followed by a transverse streaking from the bottom to the top of the slant in order to distribute the deposited milk evenly. In removing the milk from the sample to be tested it is advisable not to insert the loop more than 2 to 3 mm. into the milk. If the loop is passed into the sample to be tested for greater distance, inaccuracies will occur because milk adheres to the stem of the loop.

DATA

One of the principal considerations in evaluating the use and accuracy of any procedure, and in this case the Burri slant technic, is a comparison with the standard agar plate procedure which, although it is known to be inaccurate, is generally accepted as a basis for such comparisons.

Where the two procedures were compared using the same medium and temperature of incubation, it was found (Table I) that of 387 samples, 106 gave higher counts on agar plates than with Burri slants, while in 281 of the cases the count was higher on the Burri slants than on the Petri plates. A closer analysis of these results indicates that the percentage of instances in which the higher or lower counts occurred on Burri slants was not affected by the number of organisms in the original sample of milk until the number of bacteria present produced overcrowded conditions on the Petri plates. From these results it is evident that over a series of samples the Burri slant technic as a procedure will generally give higher counts than the Petri plate method, a finding which confirms the conclusions reached by Dorner.[2]

Burri slants are of special value when determining the presence of streptococci in samples of freshly drawn milk. In a study of 4,675 samples (Table II) of freshly drawn milk in which streptococci were not demonstrated by the Burri slant procedure, it was found that in only one of these instances were organisms evident when the sample was examined by the direct microscopic method. However, where the samples were incubated before they were examined microscopically, 55 were found

TABLE I

Relation of Burri Slants to Plate Counts

Standard Agar Plates Incubated at 37° C. for 48 Hrs.

Number of Instances Where the Count Found on Burri Slants was in the Range Indicated		*Number of Instances on Agar Plates Where there Was*	
		an Equal or Greater Number of Colonies Than on Burri Slants	*a Smaller Number of Colonies than on Burri Slants*
1,000 to 10,000	299	91	208
10,000 to 100,000	74	15	59
100,000 plus	14	..	14

TABLE II

The Detection of Streptococci in Freshly Drawn Milk on Burri Slants, and by Direct Microscopic Examination Before and After Incubation

Number of Samples	Burri Slants		Direct Microscopic Examination of Unincubated Milk		Microscopic Examination of Incubated Sample	
	Streptococci Not Observed	Streptococci Observed	Streptococci Not Observed	Streptococci Observed	Streptococci Not Observed	Streptococci Observed
4,675	4,675	0	4,674	1	4,620	55
1,372	0	1,372	1,354	18	246	1,126

in which long chain streptococci were present although none were evident on the Burri slants. The microscopic examination of incubated freshly drawn milk is one of the best procedures to demonstrate the presence of long chain streptococci. However, these figures make it evident that the Burri slant procedure is for practical purposes as accurate for use in determining the presence of long chain streptococci in freshly drawn samples as microscopic examination of the samples subsequent to incubation. At the same time, colonies are available for isolation and subsequent study.

In a study of 1,372 samples in which streptococci were observed by the Burri slant procedure, it is of interest to note that all except 18 of these samples failed to show long chain streptococci when examined by the direct microscopic procedure. However, when these same samples were incubated before microscopic examination, long chain streptococci were demonstrated in over 80 per cent of the samples. These results again indicate the surprising accuracy of the Burri slant procedure as a means of demonstrating the presence of long chain streptococci in freshly drawn milk.

DISCUSSION

The Burri slant procedure is not a method which should be considered as a substitute for either the Petri plate or the direct microscopic procedure. However, it does have, because of its simplicity and the possibility of isolating cultures, certain advantages not found in either of the above commonly used procedures. The Burri slant method is of particular value as a means of finding and isolating the long chain streptococci that occur in freshly drawn samples of milk. The procedure may be employed with excellent results as a means of quickly finding the infected udder or quarter involved in septic sore throat or other epidemics. The amount of apparatus required is small and inexpensive (largely culture tubes) and within 30 hours streptococcus colonies are easily discernible on the agar slope. These can be removed for further study. It has a distinct advantage for this work over the Petri plate method because of the limited equipment necessary and over the direct microscopic procedure because it is possible to isolate suspicious colonies.

The Burri slant procedure also is of special value for commercial dairies and food processing establishments for use in finding sources of bacteria that may contaminate the milk or food during processing. The limited amount of equipment again allows its use in the plant and the examination of a large number of samples taken throughout the processing operation.

It is also of particular value for determining the possible cause of food suspected epidemics. In those cases where a large number of sources of offending organisms must be examined, samples can generally be secured during the field investigation and immediately inoculated onto the agar

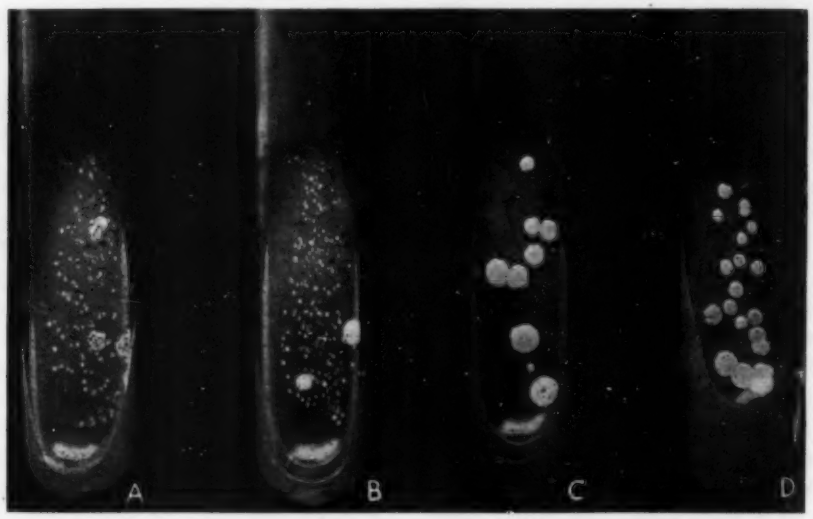

FIGURE I—BURRI SLANTS PREPARED FROM FRESHLY DRAWN MILK

A and B show a predominance of *Streptococcus* colonies; C and D show only *Micrococcus* colonies. In the latter case, the colonies may be either white, yellow, or orange, depending upon the type of *Micrococcus* present.

slopes for subsequent incubation and observation.

There are certain difficulties involved in the use of the Burri slant procedure which should be recognized. Although much more accurate than heretofore supposed, it cannot be considered, because of the rough method of measuring the amount used in the inoculation, as having great accuracy as a method of estimating the number of bacteria present.

One of the chief difficulties with the Burri slant procedure is a tendency for those who are using it in a routine manner, to place undue value on the appearance of the colonies on the slope as a means of determining the type of organisms present. In many instances, particularly where slants are crowded, the appearance of the colony is entirely different on the agar slope from the colony of the same organism where only a few bacteria are present or on agar plates. In many instances colonies of micrococci on overcrowded Burri slants will have the same characteristics as colonies of streptococci, and may easily be so recorded.

CONCLUSIONS

The Burri slant procedure is suggested as a surprisingly simple and accurate method of estimating the number of organisms present in various substances and its availability for use in detecting sources of contamination is discussed. It is not suggested as a method for accurate counting of the number of organisms present, but it is shown to have practical value for use in controlling the sanitary quality of milk and other products.

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Public Health Engineering and Sanitation Service in a Rural-Urban Area*

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THE writer has chosen to approach this topic from the standpoint of a personal experience rather than from that of an academic discussion. In this paper it is proposed to define and describe the characteristics of the San Joaquin Local Health District.

The county is located centrally in California at the head of the San Joaquin Delta approximately 60 miles east of San Francisco. It extends eastward to the foothills of the Sierra Nevada Mountains and southwest to the Coast Range. Three streams, the Mokelumne, the Calaveras, and the Stanislaus, drain from the Sierras and discharge into the San Joaquin River in the Delta area. There are some 700,000 acres of rich agricultural land, growing such products as grapes, peaches, cherries, apricots, walnuts, almonds, tomatoes, asparagus, celery, peas, potatoes, rice, sugar beets, and grain. The abundance of water provides pasturage for many herds of dairy cattle.

Ocean-going vessels and three transcontinental railroads provide world-wide transportation facilities. Seven hundred miles of paved roads in the county and direct highway connections with San Francisco and cities throughout the San Joaquin and Sacramento Valleys provide excellent intrastate transportation.

The county has a population estimated at 121,000. The City of Stockton, the county seat, has a population of 56,500 and 3 other cities in the county aggregate a population of 16,000. The rural population is 48,500 or 40 per cent of the total population.

It may be asked what bearing these characteristics have on sanitation and engineering. It is the purpose of this paper to illustrate that question and, in so doing, to develop the organization and functions of the Sanitary Division of the Local Health District.

Prior to 1923, each city had its own health department. In that year the Health District, comprising all of San Joaquin County, both incorporated and unincorporated, assumed the task of health service. The act [1] under which the District was formed is quite liberal, as can be determined from a few excerpts:

> Each Health District shall have and exercise the following powers . . . to acquire, construct, maintain and operate all works and equipment necessary for the inspection of

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water, milk, meat and other foods, the extermination of rodents, and the disposal of garbage and waste . . .

To enforce all statutes relating to public health . . . and all orders, quarantine regulations and rules presented by the State Board of Health . . .

To enforce such local orders and ordinances pertaining to health and sanitary matters within the District as may be authorized by the appropriate local authorities . . .

To exercise all needful powers for the preservation of the health of the inhabitants of the district, whether such powers are herein expressly enumerated or not . . .

This grant of power is to be liberally construed for the purpose of securing the well-being of the inhabitants of the District.

The Board of Trustees consists of a representative appointed from each of the 4 cities and one from the rural area of the county. At the present time, a doctor of medicine, two dentists, an engineer, and a farmer are members of the board. Three of these are original members, and there have been only three changes on the board in 15 years. The Sanitary Division is one of 8 divisions of the organization. The Sanitary Division in 1923 included the chief, a dairy instructor, and 3 sanitary instructors. Another instructor was added in 1926, and an engineer in 1935. It is interesting to note that 2 of the original staff are still employed, and that only 6 men have been replaced in 15 years. The average tenure of office of those now employed is 10 years.

To facilitate service, the Sanitary Division has been divided into four districts with sanitary instructors in each district. The senior dairy instructor works out of the Stockton office. The chief of the division and the engineer cover the entire county on special investigations.

The yearly report for 1924 indicates that milk sanitation and food sanitation were the principal fields of activity, while housing inspection was in its infancy. There was some supervision of water supplies and sewage connections and a preponderance of nuisance investigations.

It may be of interest to consider the activities of the division at the present time.

FOOD SANITATION

Inspection includes a check-up of sanitary conditions in each restaurant, drinking establishment, meat and fish market, bakery, grocery store, and candy shop. Considerable experimental work has been done on the sterilization of glassware in drinking establishments, but no method of laboratory check as yet has been developed which seems entirely satisfactory from the standpoint of field use. Some of the methods suggested by various writers on the subject are impracticable in a small health department. Methods which have given some useful results are: A rinse water sampling method suggested by Stone,[2] and a modification of the swab method as outlined by the sub-committee on the Standard Methods for the Examination of Dishwashing Devices.[3]

Food poisoning cases are given prompt and thorough epidemiological investigation. Cream pies, home-canned goods, poisonous mushrooms, and canned clams have been involved in some of the more recent investigations.

MILK CONTROL

San Joaquin County and its cities have passed some excellent local milk control laws. General supervision of dairy and milk supplies is under the State Department of Agriculture. This department, wherever a local health department has suitable facilities, has approved a local milk inspection service which enforces all rules and regulations of the State Department. The local service, through continuous education and judicious enforcement of the local and state laws, has succeeded in protecting the public to a high degree.

Milk control includes strict supervi-

sion of pasteurizing plants; dairy farms, milk houses and equipment; weekly laboratory checks of milk; semiannual physical and bacteriological examination of milk handlers; and general observation of dairy herds. (San Joaquin County has recently been adjudged a modified accredited bovine tuberculosis free area.) That the work of the inspection service is effective is evident by comparison. The milk score was 90.32 for the year 1923–1924, and 97.07 for the year 1937–1938. The average total count in the latter year was 7,500 for all grades and 1,800 for pasteurized milk only.

INVESTIGATION OF NUISANCES

Nuisances of all types require a great amount of attention. As one of the cardinal principles of a health department service, all complaints are courteously received and investigated. When the complaint is justified, the cause is eliminated by educational measures if possible; otherwise by court procedure.

Nuisances most frequently investigated include leaky sewers, overflowing cesspools, septic tanks, and drainage systems, promiscuous garbage disposal, odors from home incinerators, animal pens, chicken pens, vermin infestations, and insect ravages.

RABIES CONTROL

Contrary to most health department procedure, the Sanitary Division does not conduct wholesale quarantine, dog eradication, or vaccination programs. Instead, every dog bite reported is investigated thoroughly. The dog or other animal is placed under observation for a 10 day period, and at the end of that time, if no rabies develops, it is released. Any animal suspected of having rabies is held until death or killed under supervision, and the head is examined in the district laboratory. All contacts, both animal and human, are carefully traced. Our experience indicates that animal rabies seems to have a more or less definite periodicity, and this method of control has served us well. The maximum number of animal rabies reported in any one year was 96. There has not been a human death from rabies since 1921.

INDUSTRIAL SANITATION

Sanitary facilities of factories receive a general check-up. Cleanliness, convenience, and adequacy are the principal items which are noted. The main difficulty encountered in this field seems to be the inability of factory managers to estimate the number of employees correctly where work is seasonal. There is frequent overcrowding of facilities.

All schools are surveyed regarding heat, light, ventilation, water supply, sewage disposal, toilet facilities, safety hazards, and general sanitation, at least once a year.

HOUSING

The Health District is charged with the enforcement of the State Housing Act on all matters of sanitation, ventilation, and occupancy. The elimination of houses unfit for use and the general improvement of housing conditions requires time and energy. As this program usually affects someone's pocketbook, court procedure frequently becomes necessary. Overcrowding, faulty plumbing, and improper use of rooms are perhaps the most frequent violations which the division encounters. During lulls in working seasons, hundreds of agricultural and other laborers from all sections of California loiter in Stockton and congregate in cheaper lodging houses. Twelve thousand Filipinos call Stockton their home. Housing supervision in the Oriental section is a real problem.

RODENT CONTROL

The Sanitary Division has in the

past conducted several programs of rat extermination. However, most of the rodent control work is done by the County Department of Agriculture and the State Bureau of Sanitation. The division coöperates with these two agencies and gives advisory service.

AIR SUPPLY AND VENTILATION

The division has been striving for some time to improve ventilation in restaurants and places of similar nature. Many conferences have been held for the purpose of securing better hood design, and within the past two months an ordinance has been prepared which should insure a decided improvement in the air supply of eating places.

The advent of air conditioning brings with it additional problems. Many of the small installations have little or no engineering design. In fact, a so-called air conditioned establishment may actually be far more uncomfortable than before, due to uncontrolled humidity. Algal growth, mosquito breeding, and waste water disposal are related items which attend the maintenance of air conditioning systems.

WATER SUPPLY

With a few minor exceptions, all water supplies in the district are obtained from drilled and cased wells. There are 18 water supplies classed as public. A number of small joint operation supplies serve from 2 to 10 families in suburban areas. Nearly every farm home has water available under pressure and even home owners within the cities avail themselves of water so easily obtained. It is conservatively estimated that there are more than 6,000 private wells supplying water to residents of the district. The division samples each public supply 24 or more times a year. School supplies are sampled at least once a year and more often as deemed necessary. Private wells are sampled on request or when indicated by other investigations. There are a number of areas which are subject to inundation during spring floods. Close scrutiny of water sources and advice to area residents during flood periods has been of material aid in the prevention of water-borne diseases, or, perhaps, escape from these has been a matter of good fortune. Surveys of all public water supplies, comprehending complete data, are maintained and prove invaluable as a ready source of information.

The problem of holding a high standard of water quality in private wells is complicated by the increasing use of rural areas for city-like subdivisions. A lot in these areas will average 5,000 square feet. On this lot it is necessary to establish a sewage disposal system and a water supply, as well as a home and a two-car garage. Since there are no ordinances governing the activities of well drillers, the task of well protection is approached from an educational and advisory standpoint. Many conferences with well drillers and pumping equipment men have served to secure some improvement in well construction and more satisfactory protection of the casing top.

Worthy of special mention is the water supply problem of the San Joaquin Delta, an area which lies almost wholly below sea level and is protected from flooding by earth levees. Typhoid fever seemed to be an uncontrollable disease in the early twenties. It was considered impossible to obtain a potable supply of water from local sources, as the surface waters were badly contaminated, and the underground waters were salt laden. Even though water was obtained from upland sources, the Oriental and Mexican population persisted in drinking from filthy drainage ditches and sloughs.

In 1924 the district began an intensive program of immunization and brought typhoid fever under control.

The attack rate in 1924 was 133.4 per 100,000, while in 1937 it was 11.8. The sanitation factor was not particularly instrumental in this change, but the Sanitary Division is working out a solution to the island water problem. The possibilities of water treatment with small inexpensive hypochlorination machines have been carefully ascertained by field studies on a delta ranch, and it has been proved that it is now possible to obtain a potable water supply at small cost to the property owner.

Cross-connections are a particular problem in our cities. In Stockton there are about 400 wells, with so-called "garden connections." Although the division has not embarked on any particular campaign to eliminate such connections, no new ones are being permitted, and some of the largest cross-connections are being located and changed.

SEWERAGE, INDUSTRIAL WASTES, STREAM POLLUTION

It has been pointed out that the county leans heavily on agricultural pursuits. The availability of raw products and the excellent transportation afforded the finished product have made the county a great processing center. Ten canneries, 18 major wineries, 1 cheese factory, 3 milk condensaries, 2 sugar beet refineries, 2 slaughter houses, and 1 paper products plant, mean economic well-being for a community, and a headache for the engineer. These wastes, as a separate problem, or as an additional load on sewage plants that were not designed for such loads, raise many problems. Industrial wastes disposed of in our streams during summer and fall create the greatest pollution load at the time of minimum flow. Of course, the cannery manager will assure you that the water is simply good clean water with some fruit in it. The writer,[4] in investigations of the sewage load at Stockton, found that the treatment plants designed for 51,000 people were attempting to handle wastes estimated at 290,000 population equivalent. A serious depletion of oxygen and a decided increase in bacterial contamination were demonstrated in the San Joaquin River. Since this investigation, the City of Stockton has constructed new sewage disposal facilities designed to handle the load.

If wastes are discharged on land, the operating factor is paramount and many field visits, coupled with education and persuasion, are needed to prevent nuisance. How many times has one heard that evaporation takes care of all of the water which is run out upon the land?

As with water supplies, complete surveys of all public sewerage are maintained. These surveys are brought up to date as major changes occur. Treatment plants in the county range from activated sludge to the lowly septic tank.

The division has made it a policy to aid plant operators in a better understanding of the problems which occur. Recently, the engineer arranged a series of meetings for the purpose of giving operators a basic understanding of the fundamentals of sewage treatment and disposal. A bulletin is issued bi-monthly for the purpose of transmitting information to the field.

The problem of private sewage disposal is of prime importance in the suburban areas. The soils of the county range from sand to black adobe, and it is a peculiar quirk of circumstance that has seen the greatest development of small homes in areas where adobe is the principal soil. There are no ordinances in the county which are designed to control private sewage disposal systems, and it is only by constant vigilance and continuous explanation that any improvement is attained. One of the most serious outgrowths of poor disposal has been the development of

the "sewer well." The sewer well is a hole in the ground drilled to water bearing strata. It is used for the purpose of draining effluent from septic tanks and cesspools. Often a sewer well and water well will be drilled to common water bearing strata on the same or adjoining lots. An amendment was made to the State Health Laws in 1935 which made such wells illegal, and many wells have since been abated under that law.

Stream surveys have paved the way for improved sewage disposal. In the past 3 years the division has made independent surveys and coöperative surveys with other agencies, such as the State Bureau of Sanitary Engineering, the State Division of Fish and Game, and the neighboring county health departments.

In a small health unit, the engineer does nearly all of the analytical work. Those of you who have not tried it would be surprised at the amount of field work that can be handled from a small field kit which can go on the seat of a boat or in the back of an automobile. It is hoped that we may preserve our streams in a reasonable state of cleanliness and still do no serious injury to the industrial plants which use them for waste disposal.

REFUSE DISPOSAL

Here again the produce industries are involved. Disposal must be made of any solid matter which is not placed in sewers; fruit wastes, grape pomace, sugar beet pulp, asparagus butts, and celery trimmings are vile-smelling unless properly cared for. Efforts are continually being made to find some use for these waste products. In the case of grape pomace, it has been found that it can be dried and used as fertilizer and stock feed. Beet pulp can be dried and used as feed or fed wet in the locality. Both methods are being used extensively.

Promiscuous garbage dumping by private individuals along the roadside, in vacant lots, and elsewhere has received much study. Better control of garbage collection in cities has been promulgated as a means of solving this problem.

SWIMMING POOL SANITATION

In California, responsibility for the sanitation of swimming pools rests with the local health department under the rules and regulations of the State Board of Health. Examinations are made of all pools in the county and recommendations are made for improvement of pool facilities. Inasmuch as the disease transmission traceable to swimming pools is still somewhat problematical and may be placed in the category of the potential rather than the actual, it is somewhat difficult to educate pool owners and operators to accept the standard of drinking water for swimming purposes. A favorable trend in the right direction can be noticed in the increased tendency of the public to be critical of swimming water. We often find people asking if the "old swimming hole" is safe. Schulmeyer [5] has emphasized the importance of this trend in this statement:

> A pool manager will be more alert to his responsibilities if he is aware that his pool patrons are cognizant and critical of any deviation on his part from fundamental principles of pool and bathhouse hygiene.

CAMP SANITATION

When the field crops are ready, extra labor is the crying need. The migratory worker follows the crops all over California, and San Joaquin County receives its share. During the past spring and summer there have been as many as 7,000 people residing in tents, trailers, and what not, and occupying any available ground which might be used. These camps, at their inception, have few or no sanitary facilities, have poor water sources, and are decidedly over-

crowded. During the season, the entire department is busy visiting transient camps. The principal activity of the Sanitary Division is, of course, the protection of water, improvement of sanitary facilities, and protection against insect-borne diseases such as malaria.

Strangely enough, whether privies of the home-made variety, privies of the U. S. Public Health Service variety, or modern water flush toilets are provided, patrons soon create a filthy condition due to their personal habits. Camp patrols must be rigidly maintained or conditions quickly get out of hand. Certainly such situations offer huge opportunities for education in personal hygiene habits.

In so far as the enforcement of rules and regulations regarding auto camps is concerned, outside of incorporated areas the Health District has no special jurisdiction. By legislative enactment, the State Division of Immigration and Housing was given general control of auto camps in 1931. However, there is a close spirit of coöperation between the local division and the state on all matters of camp sanitation.

There are four mountain recreation camps which are used by San Joaquin County residents and maintained by local organizations. Although these camps are outside the jurisdiction of the Health District, annual visits are made and suggestions are offered for the betterment of all phases of sanitation.

MOSQUITO CONTROL—MALARIA

San Joaquin County has a number of small streams heading in the foothills, which dry up early in the year. As these waters recede, excellent breeding areas are formed.

Eight irrigation districts maintain some 1,500 miles of canal. One thousand miles of drainage ditches carry excess water to tule-grown sloughs and 400 miles of navigable water in the Delta. Twenty-five hundred acres of rice and 8,000 acres of Lodino clover dot the county with miniature lakes. Potholes and seepage channels are prevalent in the flood lands adjacent to the Mokelumne and Stanislaus Rivers. Poorly constructed cesspools, storm water catch basins, and undrained vacant lots are found in suburban districts.

With this rich field of breeding areas to choose from, it is always possible to find mosquitoes. Perhaps the more troublesome of the pest mosquitoes are *Aedes Vexans, Aedes Varipalpus,* and *Culex Tarsalis. Anopheles Maculipennis* is the prevailing anopheline, although others are present.

Malaria has always been more or less of a problem. Available historical records indicate two peaks of malaria, one in 1917 and one in 1934. Careful epidemiological investigation of each case of malaria is made by the engineer. There is little doubt that the influx of transients from Oklahoma, Arkansas, and Texas precipitated the peak of 1934. Our records show that 59 per cent of the cases were in itinerants. Coöperation of the medical profession in the county made it possible to obtain laboratory confirmations on 86 per cent of the cases reported in 1937.

The district carried on control measures in malarial areas for 4 years. At the present time, advisory service is given groups and private individuals. In the case of local nuisance, remedial measures are required.

INDUSTRIAL HYGIENE

Industrial hygiene is a new field in public health work in California. A State Industrial Hygiene Service was formed in 1937. The engineer and health officer are coöperating with the state on many local problems, among which may be mentioned the use of carbon tetrachloride in dry cleaning establishments, and carbon monoxide

asphyxiation from motor vehicles. Plans are now being made for surveys in wineries to determine the hazards which may exist.

PUBLIC HEALTH PLANNING

It was recognized many years ago that the health agency had an interest in planning, yet as recently as 1927 Dr. Sippy states:

> Nevertheless, despite the basic health principle involved in the housing and city planning program, it is all too frequently customary to omit the advice of the health department or its members.

Today the picture has not been materially altered. Even the modern planning engineer of present-day cities rarely attacks planning problems from the public health viewpoint. Perhaps one of the most urgent planning problems in the health district is that of suburban building beyond purely arbitrary city limits. The sanitary hazards have been mentioned elsewhere but are worthy of repetition. Improper sewage disposal, endangered water supplies, overcrowded houses, courts, and apartments, structurally unsound buildings, all challenge the Health District to exert its efforts toward better planning of suburban developments. Analyses of living costs which show false economies, and potential health hazards of the unsupervised community have been canvassed and placed before many people. The answer is "Yes, but I don't have to pay any city taxes."

Within the last two years the Federal Housing Administration program has offered an excellent entry to better health planning. The Federal Housing Administration requires that all private sewage disposal systems and water supplies of houses insured by it shall have certificates of approval from the local health authority. The district has adopted standards which will guarantee a reasonable protection of the home owner and his investment, and these same standards are used as a basis for recommendation on all private water supplies and sewage disposal systems within the jurisdiction of the district. Since the start of the program, the district has certified 59 water supplies and 91 sewage disposal systems on recommendation of the engineer. Recently one entire subdivision has made Health District approval of the water and sewerage systems a requirement. The Federal Housing Administration is also insisting on better standards of construction, lot area, etc. An architectural inspection service is maintained by the Federal Housing Administration for this purpose.

Political subdivisions within the district are now frequently requesting assistance in the preparation of enforceable ordinances pertaining to sanitation. Auto and trailer camp, and garbage ordinances have been prepared recently.

ENGINEERING

The engineer's part in the work of the division is not easy to define, as he both complements and supplements the work of the remainder of the staff. He serves as an assistant and adviser to the staff on many special problems in the field of food sanitation, dairy sanitation, nuisance investigations, industrial sanitation, housing, air supply and ventilation, refuse disposal, and camp sanitation. Activities which are predominately engineering functions include water supply, sewage disposal and stream pollution, swimming pool sanitation, mosquito control, and industrial hygiene. Public health planning, and public health education are functions of the staff individually and collectively.

DISCUSSION

How do the division activities correspond with the work which is thought to be within the purview of

sanitarians and engineers? Hyde[7] has divided typical problems and activities in environmental control into 10 general classifications. It would be almost a repetition of our activities to name them. Some of the items he mentions are coöperative enterprises under state jurisdiction; others, due to local conditions, may require only a minimum of attention. Yet there remains little in his classification which has not become a part of the local sanitation service.

Thus a well coördinated staff of four sanitary instructors, a dairy instructor, an engineer, and the division chief, under a health executive who comprehends the full scope of environmental sanitation, serves a county which, due to its characteristics, offers nearly every problem which is considered within the field of sanitation.

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A Simple Tellurite Medium for *B. diphtheriae*

NELL PETERSON HALL

Branch Laboratory, State Department of Public Health, Champaign, Ill.

SEVERAL media containing compounds of tellurium have been devised for the isolation of *B. diphtheriae* from mixed cultures. These have been rather difficult to prepare and, for that reason, have not been used in small laboratories and hospital laboratories.

A medium was sought which would be easily prepared yet give as good results as other tellurite media, allowing a more rapid isolation and identification in pure cultures.

HALL'S TELLURITE MEDIUM

Dissolve 4.5 grams of Bacto Cabbage Infusion Agar in 100 cc. of distilled water. Sterilize at 15 lbs. pressure for 30 minutes. Cool to 55° or 60° C. Add 10 cc. of citrated or defibrinated blood (sheep, ox, horse or human) and 10 cc. of a 0.5 per cent aqueous solution of potassium tellurite. The tellurite solution may be stored in the icebox and kept indefinitely.

Pour in plates and cool with tops tilted. Plates are not easily contaminated.

Plates of the medium may be inoculated directly from swabs or from cultures on Loeffler's medium, and it should be noted that at least 18 to 24 hrs. incubation of the plates is as a rule necessary for the naked eye recognition of colonies. Smears may be made and examined, however, after overnight incubation. In making smears, the entire surface of the inoculated medium should be scraped with the loop to obtain the growth.

Among the numerous advantages possessed by this medium are:

1. It completely inhibits organisms, such as staphylococcus, streptococcus, *M. catarrhalis*, pneumococcus, etc., while the diphtheria bacillus and organisms of the diphtheroid group grow uninhibited, with typical colony appearances. *B. diphtheriae* grows typically as a round, smooth colony, greyish-white or black in color.

2. Petri dishes may be prepared well in advance of the time they are to be used. Plates prepared and kept at icebox temperature 2 or 3 weeks were found to give equally as satisfactory results as those freshly prepared.

3. The medium may be made in very small amounts, making it valuable for small and hospital laboratories.

4. It is especially valuable in the isolation of mixed cultures for tests of virulence.

5. Several cultures (10 or 15) may be put on one plate by marking sections with a red wax pencil.

6. A higher percentage of positives may be obtained on cases for quarantine release. A pure culture of *B. diphtheriae* may be had on this medium with a negative one on Loeffler's medium.

7. It has the advantage over Loeffler's medium of being easy to prepare, and a higher percentage of positives may be obtained.

8. The organisms are much larger than on Loeffler's medium.

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EVART GRANT ROUTZAHN

THIS Association has mourned the passing of many persons whose genius has touched its affairs. None were loved more than E.G.R. He wore his mantle of greatness with such unconcern that few were conscious of his immortal spirit until after he had passed by. He was in every sense an apostle of health, loved for his simplicity, his enthusiasm, his essential shyness, his good humor. Like every great teacher his lessons were free of cant and dogma, shunning pompous theory and high sounding phrase.

Mr. Routzahn was born in Dayton, Ohio, January 6, 1869, and was educated in the public schools there. His interest was in social work which he followed for several years. He directed a traveling exhibit for the National Tuberculosis Association from 1906 to 1912. Thereafter, until his retirement in 1934, he was Associate Director of the Department of Surveys and Exhibits of the Russell Sage Foundation.

He joined the American Public Health Association in 1912 and became a Charter Fellow in 1923. In July of that year he began editing the section on Health Education which has been a distinguished part of the *Journal* ever since. His last contribution to this section appears in this issue. There, too, will be found an expression of the regard of his fellow workers in the Health Education Section and in the Committee on American Museum of Hygiene.

For many people Health Education meant E.G.R. Rarely has the personality of one man been so clearly identified for so long with the leadership of a movement. Younger members will forget that he was the first paid employee of the National Tuberculosis Association. He piloted the first tuberculosis exhibit—caravan fashion—over the country, and left in its trail a series of enthusiastic committees most of which developed into local associations that ultimately became a part of the vast machinery for popular health education developed by that association.

It should never be forgotten that it was he who gave health education a place

in the sun in official health work by his successful efforts to establish a Section on Health Education in the American Public Health Association. He worked for recognition of health education as a specialty at a time when to many it was only a name designating a vague activity without technic, method, or purpose. The Section was created largely through his single-handed labors, and in its second year he was one of the three Fellows it could boast. He lived to see it assume its true prominence among the ten Sections, both in numbers and in weight, with a total membership of 600 and a Fellowship of 105. It was typical of him to accept the Vice-Chairmanship of the Section in its first year. He served as Chairman in 1923, and later assumed successively the Secretaryship and again the Vice-Chairmanship. At the Association's New York City meeting in 1937, on the occasion of the Section's 15th anniversary, the Section commemorated that event in the only appropriate fashion—by a testimonial luncheon to Mr. Routzahn. To the many who attended, it was apparent that the accomplishments of the Section and the accomplishments of E.G.R. were one and the same thing.

This many-sided man leaves behind him a record in social work publicity and in adult education as brilliant as that in health education. The members of this Association knew him best in the field of health education, although his book, *Publicity for Social Work,* published in 1928, was as familiar to them as to the social workers for whom it was written. His wife, Mary Swain Routzahn, collaborated with him in the preparation of a similarly widely known *A.B.C. of Exhibit Planning,* published in 1919.

Mr. Routzahn was first and last a collector. He collected friends, converts, ideas, gadgets. His collecting propensities brought rich returns to those who haunted Health Education and Publicity Headquarters at the Association's Annual Meetings. He had built up an encyclopedia of health education materials over a period of twenty years and it was from this incredible store that he drew for the exhibit he conducted each year.

Mr. Routzahn happily combined in his character and intellect the patience of the collector, with the organizing vision of the teacher. His advice has been sought by countless organizations and individuals everywhere. His painstaking efforts to record and portray for his professional colleagues new ideas, suggestions, and improvements in the thousand and one specialized technics embraced in health education, placed his name on many lips, and made him an "institution" within the public health movement—a position which he occupied with modesty and simplicity that in themselves are marks of greatness.

He was a being who loved life and he never lost his youthful spirit.

SANITARY REGULATIONS AS TRADE BARRIERS

PUBLIC health legislation has one and only one legitimate purpose. It is enacted solely to provide legal means for the protection of the health of the people. This it accomplishes by imposing such reasonable restrictions upon the conduct of life, liberty and property as are necessary to promote the common health and general welfare.

Health legislation is not intended as an instrument to favor local business at the expense of outside industry. In recent years, however, there seems to

have been an unfortunate tendency to employ sanitary regulations as an obstacle to the free movement of commerce between the states.

Many specific instances of the misuse of health legislation in placing drastic restrictions upon the legal right to market wholesome commodities, particularly dairy products and other foods, are given in a special report recently submitted to the Secretary of Agriculture by the U. S. Bureau of Agricultural Economics.[1] Health officials will find much that is interesting and provocative in this well documented report.

While conceding that laws and regulations adopted by states, counties, and cities have helped to bring about a tremendous improvement in the sanitary quality of our market milk supplies, this report points out that licensing, inspection, and pasteurization requirements are often discriminatory against outside business, and are enforced in such a manner as to limit the sources of dairy products to local business. As a remedy for this situation, the suggestion is made that Congress adopt uniform sanitary requirements for all dairy products moving in interstate commerce.

Reasonable and valid public health legislation, properly enforced, may of course affect private business, but it is a fundamental principle of law in this country that all such legislation must so operate as to afford to everyone the equal protection of the laws.[2] State health laws may also legitimately interfere with interstate commerce, but only when their exercise under the police power of the states bears a real and substantial relation to the protection and preservation of the public health. Real or alleged economic necessity is no justification for the capricious use of public health legislation.

The courts of last resort of this country have frequently upheld the legal principle that public health legislation is constitutional and its enforcement by executive departments is valid only when such legislation has an actual public health objective. The courts will look behind the laws for the motives that have actuated their adoption.

Thus, where a city health department attempted by regulation to restrict arbitrarily the inspection area for dairy products entering the city, it was held recently by a United States District Court that the regulation was invalid as an unwarranted interference with a legitimate business.[3] So long as the product is wholesome, it cannot be prohibited merely on the capricious grounds of distance.

There are numerous other court decisions to similar effect.[4] The United States Supreme Court has ruled, for example, that it is unreasonable and improper for a state to require a wholesome food product to be colored pink so as to distinguish it from the competing products of local merchants.[5]

Public health officials are guardians of the people's health, and not monitors for local industry. Free movement of trade between the states is an essential feature of the American plan of government. Health authorities should stick to their own last, and leave the troublesome economic problems of industry to the tender mercies of other appropriate agencies.

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PROPRIETARY MEDICINES

THE scientific practitioners of medicine have set up for themselves in recent years a rational therapy in so far as the use of drugs and medicines is concerned. The underlying principles of a rational therapy should be known to every public health official and worker. All medicines should first be classified into secret-formula and non-secret-formula medicines. The terms, proprietary, patent, and nostrum should be well understood. Proprietary means one in which there is some ownership right. It may be a copyrighted name or design on the package or the package itself. It may be that the method of manufacture is not open to everyone. It may have a secret formula. The fact that it is a proprietary medicine does not of itself classify it as either good or bad. One should be opposed as a matter of principle to all secret-formula medicine. There is no such thing as a patent medicine any more. When one uses this term he usually is thinking of a nostrum. Official medicines are those that appear in the *United States Pharmacopoeia,** the *Homeopathic Pharmacopoeia* of the United States and the *National Formulary*. They appear here under definite names and whether they be a single drug or chemical or combinations of either or both they have definitely non-secret-formulae. Nonofficial medicines comprise all medicines not found in these three books. Of the nonofficial medicines there is a recognized list that is an accepted one. This list comprises some four hundred non-secret-formula medicines found in *New and Nonofficial Remedies,* which is revised annually and to which supplements are issued oftener. The *United States Pharmacopoeia,* the *National Formulary* and *New and Nonofficial Remedies* taken together contain about 1,670 non-secret formula medicines. Should not this be enough for any practising physician or for any hospital? Just think what a joy a medical mathematician could have with combinations and permutations.

The new Food, Drugs and Cosmetics Act passed June 25, 1938, and entirely effective (some parts became effective upon passage) June 25, 1939, will be helpful in giving physicians, hospitals, and consumers much needed knowledge of nostrums. The Act explains that the term "label" means a display of written, printed, or graphic matter upon the immediate container of any article and requires that any word, statement, or other information on the label must be on the outside wrapper also, or the outside wrapper be such that the label is visible through it. The term "labeling" in the Act means all labels and other written, printed, or graphic matter upon any article or any of its containers or wrappers, or accompanying such article. The Regulations add that labeling includes all written, printed, or graphic matter accompanying an article at any time while such article is in interstate commerce or held for sale after shipment or delivery in interstate commerce. This new law requires that a medicine for use by man which contains any of the 17 listed narcotic or hypnotic substances such as barbituric acid, morphine, cocaine, etc., or any chemical derivatives of them that have been designated by regulations as "habit forming" shall contain on the label the name, quantity, and percentage of such substance with the statement "Warning—May be habit forming." The new law also requires that drugs not designated solely by an official name (nonofficial ones) must bear on the label the common or

* Recognized as an official compendium in the Food, Drugs and Cosmetics Act of June, 1938.

usual name if there is one, and if made from two or more ingredients the common or usual name of each ingredient and the name and amount of alcohol, bromides, acetanilid, amidopyrine, thyroid, and fifteen other drugs or any derivative or preparation of them. It explains that if compliance with "this paragraph is impracticable, exemption shall be established by regulations"; but it is difficult to think of a case where it is impracticable. All medicines given an official name must comply with official requirements or else state on the label just how they differ from the official drug.

Physicians and hospitals should limit their drug usage to U.S.P., N.F. and N.N.R. drugs, for, as rapidly as new drugs are clinically tried and found worthy they will be included in one of these works. If it were then possible to convince physicians, clinics, hospitals, and public health officials that whenever case histories are taken the patients should be asked about medicines they have taken recently, some very valuable information would be obtained. It might even lead to learning the cause of some ills. Do we have illnesses due to nostrum taking? It is true that many patients may not always give this information or may give it only in part, but the amount collected would surely be enlightening. A beginning might be made with cathartics, hypnotics, and analgesics, and whoever does this faithfully will in all probability extend his questions later. Someone should make a study of this subject.

PUBLIC HEALTH EDUCATION

THIS section of the Journal is printed for the first time in many years without an asterisk following the title and referring to the modest footnote "Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22nd St., New York, N. Y."

Countless readers have obeyed that direction and turned to Mr. Routzahn for advice and assistance on subjects of such diversity and range as to defy classification.

The abundant source of variegated information which was Mr. Routzahn and the knowledge he shared so generously through this Section and through correspondence are removed by death. Evart Grant Routzahn, the familiar E G R, died on April 24.

The Editorial Board removes the asterisk with profound regret and presents here his unfinished and interrupted work—the work upon which he was engaged for this issue, and which is his last contribution to the *American Journal of Public Health*.

When the Western Branch Meets—July 23–28, 1939, in Oakland, Calif., the Western Branch, A. P. H. A., will offer to—

. . . members who are interested in health education of the public and health education in the schools an outstanding Health Education Symposium which will take place on four separate half days during the week. Except for one address by an outstanding guest speaker, there will be no formal papers. The Symposium will be presided over by an authority in the field of health education. The entire group will be divided into two main sections—one devoted to school health education, the other to health education of the public. The school health education group in turn will be divided into at least three divisions—one on classroom teaching, one on school health service, and one on physical education and recreation; each of these divisions to be given ample opportunity for round-table discussion of its particular problems and presided over by an outstanding leader in this field. The group interested in health education of the public will in turn be divided into at least four divisions: one on the spoken word; one on printed materials; one on radio, cinema, and pictures; and one on museums and exhibits; each led by an outstanding authority. After each division has discussed its problems, all will come together under the section chairmen to hear and discuss a summary by each division chairman. The final session will be for the purpose of hearing and discussing a summary report from the two section chairmen, the address of the guest speaker, and a final summary and integration by the general chairman.

Say It With Pictures—If one has a story to tell and is willing to use pictures with a few words only, *Children's Museum News*, monthly issued by Children's Museum, Park Place, Brooklyn, N. Y., is worth examination. Pages are 7 by 9 inches; one or two photographs on each page (they "bleed" to one or more edges of the page); with 30 to 90 words in black face type on a page; dull finish paper.

In the Recent Past—Farm and Home Week, an annual event at Cornell University, included two health lectures a day under auspices of Division of Public Health Education, New York State Department of Health.

Are You Approved by Your Secretary?—How good your secretary is depends quite a lot on how good a boss you are. For everyone doing a health education job is "How to Be a Hero to Your Secretary," by G. Torson, *Saturday Evening Post,* Jan. 7, 1939.

Why Not Use the Blackboard?—Quoted from *The Reporter,* New York (Nov. 1938):

> The speakers should use the blackboard to illustrate their talks. With the exception of . . . and . . ., all of the speakers let go a barrage of chatter which would have been infinitely more effective if they had used the blackboard which was available for illustrating their talks.

Why not begin in staff meetings and committee meetings?

A Newspaper Health Supplement—The special edition for 1939 opens with *Better Health,* a tabloid section of *New Haven Sunday Register* for February 26, 1939. *10 cents.* A well selected range of contents prepared by state and local authorities.

New Postage Rates—Those who issue books or pamphlets of 24 pages or more, will wish to study the new postage rates for books. Annual reports do not benefit by these rates.

Social Work Year Book—"Social Work Year Book" for 1939 (Russell Sage Foundation, New York, N. Y.) renders a valuable service, even though adult health education receives scant recognition in a sentence or paragraph here and there. Only one of these references of two words gets into the index. Paragraphs will be found on pages 236, 332, 337–338, 419–420, with minor references on pages 333, 335, 336, 340, 341.

For Children—A series of sheets with letters and pictures in outline for coloring come from Health and Cleanliness Council, Aldwych House, Aldwych, London, W. C. 2. The 4 sheets are 6 by 9 inches. In view of the wide variety of material offered commercially for coloring by children, more use of the idea might be advantageous in health education.

Social Hygiene Publicity Aids—A "Social Hygiene Kit" is offered free to agencies sponsoring community or group meetings. Includes program suggestions; press book with news stories, editorials, etc; talks and spot announcements for radio; lists of available literature, films, exhibits, and other materials; much material on syphilis campaign. Address: American Social Hygiene Association, 50 West 50th Street, New York, N. Y.

Health Magazines—The February, 1939, issue of *Bulletin,* National Tuberculosis Association, 50 West 50th Street, New York, N. Y., includes a helpful annotated list of popular and professional health periodicals. This seems important enough to republish in the *Journal* in several installments. When completed we hope to hear from readers who believe that any omitted periodical should be included. It is likely that libraries would be interested in this check list.

Says the *Bulletin:*

> Readers of the *Bulletin* are calling upon various sources for information on magazines and journals in the field of public health. The National Health Library, to which the National Tuberculosis Association contributes, carries a regular file of more than 500 periodicals. Miss Isabel Towner, chief librarian, has prepared for the *Bulletin* a list of some of the frequently used periodicals. We publish this list below with brief annotations as to the type of publication. This list does not include strictly medical journals although from time to time they publish articles of interest to health workers.

Annual Reports—"Visual Review: 1939" is the annual pamphlet issued for school people by Society for Visual

Education, 100 E. Ohio Street, Chicago, Ill. *Free.* Its value to public health workers is in its fresh glimpses of what the schools are doing in audio-visual education. We need to know what is going on inside the schools if we wish to be coworkers, and not merely outsiders trying to inch our way into the schools.

FOR EDUCATION OR REFERENCE

"Are You a Mouse?" Or, will you fight for cleanliness in eating places? Reprint from *Health Officers News Digest,* 30 Rockefeller Plaza, New York, N. Y. *Free.*

"Free and Inexpensive Materials: Maternal, Infant, and Child Welfare." Pamphlet sources. *American Journal of Nursing,* 50 W. 50th Street, New York, N. Y. April, 1939. *35 cents.*

From Bureau of Home Economics, Department of Agriculture, and to be ordered through Superintendent of Documents, Washington, D. C.:

"The Farm-Housing Survey." Physical features of 595,853 farmhouses, *15 cents.*

"Housing Requirements of Farm Families in the United States," by M. Wilson. Suggests "desirable features of comfort and convenience." *10 cents.*

"Make Safety a Habit" is a 172 page pamphlet on personal safety practices issued for the guidance of employees of Continental Oil Co., Oklahoma.

The ninth in a series of annual publications in the interest of street and highway safety. "Lest We Regret" is a 36 page pamphlet in which pictures and text, diagrams and statistics are presented to arouse a sense of responsibility and a desire to do something about highway safety. Quantities for distribution to clubs, schools, and other organizations supplied upon request. Permission is given to reprint anything in the pamphlet. Glossy prints and mats will be available.

"Snakes: How to Know Friend from Enemy," by R. S. Eaton. *Red Cross Courier,* Washington, D. C. April, 1939. *10 cents.* Myths and facts; and facts to lessen the death rates.

"Syphilis and Your Town" is a 12 page folder supplementing "Syphilis: Its Cause, Its Spread, Its Cure." Both from U. S. Public Health Service, and sold by Superintendent of Documents, Washington, D. C. *$1.00* for 100 copies.

The new issue describes the situation in a city of 100,000, and outlines nine major elements in a control program adaptable to different communities. Based on a series of 9 questions.

"These Accidents Were Caused, They Did Not Merely Happen" heads a 2 page spread in *California Safety News,* Sacramento. March, 1939. There are 14 case stories of accidents and what caused them.

"What Councils of Social Agencies Do." Community Chests and Councils, 155 E. 44th Street, New York, N. Y. *$1.00.* Background information for health agency members of local councils. The chapter on "Education" includes both self-education and community education.

"What's Your Score?" is a set of statements, some true, some false, which appear in a back page of *Hygeia* in March, 1939 (535 N. Dearborn Street, Chicago, Ill.). The statements are based on articles in the same issue of *Hygeia.* Whether true or false is indicated (on another page) with page reference to the supporting information.

The Department of Social Welfare and Public Health, American Home Economics Association, has a Committee for the Exchange of Radio Scripts. The committee now offers 15 scripts in narrative form, and 31 dialogues, most of which have to do with foods and nutrition. Borrowers pay postage both ways. For a list of scripts, write to:

Pauline Murrah, Nutrition Consultant, Dept. of Health, 125 Worth St., New York, N. Y.

A "different" mimeographed report is that issued by the Anti-Tuberculosis League, 6101 Arcade Building, Seattle, Wash. Letter size pages; one side each leaf blank; large size cartoon characters on several pages ask significant questions—which are answered. A slightly more opaque paper would have given a better effect, and slip sheeting would have aided.

"Health Promotion Week" in Illinois. May 1–7, 1939. State Department of Health, Springfield.

MAGAZINE ARTICLES

"April May-Day," by E. S. Countryman. *Public Health Nursing*, 50 West 50th Street, New York, N. Y., February 1939. *35 cents*. Some drawbacks; how to get the most out of the day.

"Hospital Visitors." Editorial. *Hospitals*, 18 E. Division St., Chicago, Ill. April, 1939. Some problems to be met. By means of the radio, leaflets, and the press, the community should be brought to the realization that visiting the patient in a hospital may be misdirected sympathy which taxes the strength of the patient and retards his speedy recover. (With much wider application than the hospital.—Editor)

"Prompt Registration of Copyright and Its Publicity Value," an article in *Publishers Weekly*, 62 W. 45th St., New York, N. Y. (Feb. 18, 1939; *15 cents*) tells how it is to the advantage of publishers to send their new books promptly to Library of Congress. The delinquents include many special organizations or their small city publishers.

"Selling Health in the Mountains," by E. L. Tiffany. *Public Health Nursing*, 50 West 50th Street, New York, N. Y., Feb. 1939. *35 cents*.

A colorful tale of a nurse's work with the hill people of Eastern Tennessee, where the health department is introducing itself to a people hesitant to accept change.

NEW

Not new in B.C., but new to us is *Bulletin*, British Columbia Board of Health, Victoria. Mimeographed. "Contents" on cover. A brief article about "A woman who made history," distributed by the Health League of Canada, shows a good use being made of "Typhoid Mary."

Health Section News Letter. World Federation of Education Associations, 200 Fifth Avenue, New York, N. Y.

EVART G. ROUTZAHN

MEMBERS of the Public Health Education Section of the American Public Health Association deeply mourn the loss of their leader and friend, Evart G. Routzahn. It is almost impossible for us to think of the Section without him for it was his personality that gave it zest and color. At a time when only a scattered few were giving serious thought to health education as a specialty of public health E G R saw the advantage of banding such workers together. He nursed the foundling Section, laid on the doorstep of the American Public Health Association, until it was accepted as a lusty member of the public health family. All through the years he guided its stumbling gait and happily he enjoyed the satisfaction of seeing his child grow sturdy and respected.

Though E G R never sought honor nor office, both were thrust upon him and he carried them well. For the sheer love of the cause he labored for its well-being. Each month his cryptic paragraphs in the *Journal* stimulated us; many of us turned first to his pages. Annually his exhibit was the rallying place of all loyal members of the Section, and many a youngster and veteran in the field of health education found treasure there. To E G R we turned often and never in vain. With the advice he gave there was always a glint of humor, with his service always a beaming smile. His criticism, eagerly sought, was always penetrating but never with a sting. Mostly we loved him for his friendliness — for his bubbling good will.

We thank God that the bench-mark E G R is indelibly impressed upon the Public Health Education Section. Time, which mellows sorrow, will never efface that bench-mark. We who worked, and planned, and laughed with him have been enriched by the comradeship, and that wealth grows more precious with his passing.

AN APPRECIATION
of
EVART GRANT ROUTZAHN

Adopted by the Committee on American Museum of Hygiene of the American Public Health Association, upon his death, April 24, 1939.

EVART GRANT ROUTZAHN, pioneer in health education and member of the Committee on American Museum of Hygiene of the American Public Health Association, died in the City of New York on April 24, 1939. Whereupon the following minute was adopted by this Committee:

Upon his death, the Committee on American Museum of Hygiene wishes to express appreciation of the singular service Evart Grant Routzahn has rendered the public health movement and the American Public Health Association, through the latter's Committee on American Museum of Hygiene, of which he was a charter member; and to record the admiration and affection with which his rare ability, tact, and generous devotion in the cause of health education have inspired his associates on this committee.

An intimate friend and adviser of individual members of this committee, Mr. Routzahn gave his discerning insight, sagacious judgment, and broad experience to the initiation of formal health education technics in the United States during the past quarter century

and to many other philanthropic and professional services devoted to promotion of the general welfare. He was among the pioneers in health education who maintained a courageous confidence in the utility of visual educational method in raising the level of national vitality by spreading health knowledge among the masses. To this cause, long retarded by meager resources and professional apathy, he gave generously of his time and energy; and by contribution of his vision, steadfastness of purpose, and creative leadership, helped to make the work of this committee effective and its influence widespread.

It is of special regret to members of this committee individually that Evart Grant Routzahn did not live to see the exhibits on medical science and public health at the New York World's Fair 1939, which were part of his planning and which tangibly express a scheme of educational method that he labored so devotedly to introduce into the American health education scene.

The committee wishes to express its deep sympathy to Mr. Routzahn's wife, Mary Swain Routzahn, and to other members of his family. His inspiration, his personality and his loyal service will abide in the future work of this committee, and in the memories and work of its members.

BOOKS AND REPORTS

A Fundamental Approach to Bacteriology—*By Courtland Sawin Mudge and Floyd Russell Smith. San Francisco: J. W. Stacey,* 1939. 265 pp. Price, $2.50.

As the authors say in their preface, this book does not quite reach the dignity of a textbook but it is not the conventional laboratory manual. The dominant idea of the plan which the authors have adopted is to gain and maintain the interest of students by grounding them in basic principles which provide them with the reason for doing the work set before them. This does away with the drudgery of dry memorizing. They are taught to know why they are doing things instead of doing them by rote. The authors point out that much of the new work constantly going on does not get into textbooks for a long time, or not at all, and they have attempted successfully to avoid this fault of teaching.

The book is an excellent laboratory guide for general bacteriology. The material is well selected and well prepared in simple and interesting fashion. Much of the "newer work" not found in the ordinary textbook is included, such as physical phenomena, oxidation-reduction, statistical methods, etc. The arrangement of the book is good and it contains a number of excellent illustrations. It is written in rather unusual style calculated to hold the interest of the student.

The printing and make-up of the book are good and it has ring binding which has considerable advantage for laboratory work, since the book lies flat at any opening.

We wish that the authors had not indulged in the all too prevalent trend of having an introduction by someone not connected with the writing of the book. Such an introduction is of necessity an apology, though intended as a boost. "Good wine needs no bush."

This laboratory manual can be entirely recommended for the purpose for which it was designed.

MAZŸCK P. RAVENEL

Play and Mental Health, Principles and Practice for Teachers—*By John Eisle Davis. New York: A. S. Barnes Co.,* 1938. 202 pp. Price, $2.50.

So much has been written on play that is ephemeral, that it is a pleasure to review a book based upon scientific observation and practical experience. The author presents his material from the developmental, dynamic standpoint with special emphasis upon the mental hygiene value of properly conditioned play. In his words, "Play is this modifiable experience which in the hands of the child and the hygienically trained teacher possesses so many elements out of which to organize and project lessons vitally related to the child's most effective growth and wholesome development," play may be regarded either as a conflict or as cooperative competition. Both of these concepts are logically considered. "Modern educators emphasize coöperation as the effective keynote and the criterion of happy conduct particularly in play."

The chapters on "Play and Psychic Adjustment" and "Play and Adjust-

ment to the Outside World" are stimulating reading and are conducive to clearer thinking in the field of education. "The teacher should never forget that it is not activity alone but what activity means to the child that determines its value." The outcome of ideal play should be happy socialization of the child. Each chapter is followed by a well selected bibliography. The hygienic objectives in play education are succinctly stated at the end.

RICHARD A. BOLT

The Etiology of Trachoma—*By Louis A. Julianelle, Ph.D. New York: Commonwealth Fund,* 1938. 248 pp. Price, $3.25.

For those attempting to follow the expanding area of the virus infections, this volume should prove of great interest.

It is the first extensive work dealing with the etiology of this world-wide disease since 1914. It is a not too detailed, judicial presentation of most of the research that has been done on trachoma. The major portion of the monograph is given to a consideration of the more recent studies made by the author and others which have resulted in the present concept that trachoma is probably a virus infection.

It goes even farther. It develops the interesting picture of the two virus diseases of the human conjunctiva, trachoma and inclusion-body blennorrhea, which are probably closely related but it is only the latter which has been found, so far, naturally to infect the genitourinary passages of any animal.

The three main problems of the research worker in this field have been:

(a) Finding a suitable experimental animal
(b) Unsolved problems connected with the successful passage of the virus through a filter
(c) Failure so far in culturing the virus on living tissue

Certainly, after reading this work one must conclude that trachoma is a disease of the conjunctiva, transmitted by an infectious agent which passes a filter. Whether this infectious agent is the inclusion-body found in the epithelial cells of the conjunctiva in trachoma is not yet proved although Thygeson has certainly made a good case for it.

C. E. RICE

A Short Encyclopaedia for Nurses—*By Evelyn C. Pearce. (3rd ed.) New York: Dutton,* 1939. 686 pp. Price, $3.50.

It has been a real pleasure to study this book which goes well as a companion piece to *A General Textbook of Nursing,* by the same author. Although not so stated on the title page, this is a 3rd edition, in which the author has taken advantage of the reviews made of the former ones. The greatest change appears to be that an index has been added, which the author believes will be a help to readers.

Not in the way of criticism, but as a question which has long dwelt in the mind of the reviewer, we may ask whether or not it is wise to make things too easy for students. Of course, the book is not intended to take the place of thorough study on the part of the nurse, but is an excellent reference book and refresher, both for students and teachers.

The printing and make-up are excellent. Written by an Englishwoman and printed in England, we find the English spelling of many words which have been shortened in our typical American haste. For the purpose for which it is designed it can be unreservedly recommended.

MAZŸCK P. RAVENEL

Public Health Administration in Maryland—*By Maryland State Planning Commission, Baltimore, Md.,* 1938. 153 pp. Price, $1.00.

In these days of rapid development

of public health administration, this comprehnesive review of the structure, functions, administration, and relationships of the state and county health organizations in Maryland is both constructive and timely.

The Chairman of the Commission, Abel Wolman, calls attention to guiding principles disclosed in the report which rest upon such basic considerations as the following:

1. Trained efficient personnel is indispensable (perhaps the most important factor) in the adequate functioning of any public health organization.
2. The formulation of a program with obtainable measurable objectives is a prerequisite to future action.
3. Since the effectiveness, development, and integration of the various elements in county government may aid or hinder the development of satisfactory health services, an effort must be made to coördinate and integrate all of the public activities in each county, so that the taxpayers may receive for each dollar expended, the maximum of public health and welfare.

Other factors emphasized are the importance of coöperation between official central and local units and unofficial agencies, utilization of interests of lay advisory groups, extension of health education, development of research facilities to a higher degree, and consolidation of all state health functions into one State Health Department.

The report is divided into four parts. Part I deals with administrative and technical services; Part II gives consideration to a special county government project in which such services as public health, education, social and economic welfare would be integrated as interrelated members of a unified county program under the leadership of a trained county coördinator; Part III comprises an administrative study of official and nonofficial health and welfare organizations: Part IV consists of a survey of Anne Arundel County, with special reference to public health, medical care, and social welfare.

The report is arranged in a somewhat novel manner, each major section containing a series of challenging questions coupled with comments on practical aspects of the problems studied, factual data, and suggestions for future planning. Coming from a jurisdiction in which the efficiency of the state health department has long been recognized, this study offers much solid food for any administrator of public health who is hungry for ideas. The report is likewise full of useful information and stimulating suggestions for the student of government.

IRA V. HISCOCK

Health at Fifty—*Edited by William H. Robey. Cambridge: Harvard University Press,* 1939. 299 pp. Price, $3.00.

For 33 years the Harvard Medical School has sponsored a series of free Sunday afternoon lectures on medical subjects. The attendance has been large and there have been many demands for copies of the lectures. As a result, 12 of the most popular lectures given during the past 3 years have been selected and are now published in this volume. These are on subjects which are of interest to everyone and about which one section or the other of the public is constantly seeking information.

The editor very properly warns against misunderstanding the title of the book, since health at 50 years of age implies the best sort of care during childhood and adolescence. The title, however, is good. It is constantly being pointed out that the prolongation of life in America, about which we boast, is due to the saving of life during the first few years and that we have done little toward conservation after middle life. These lectures are devoted to that period of life.

The lectures are written for the laity in language that can be easily understood by anyone with ordinary educa-

tion. It is an extremely useful book, authentic in every detail, which deserves a place in every public library. The printing and make-up are excellent. There are no illustrations.

MAZŸCK P. RAVENEL

Pediatric Nursing—*By M. Corrinne Bancroft, Elizabeth Pierce and Bessie Cutler (3rd ed., completely revised, reset, enlarged). New York: Macmillan,* 1938. 652 pp. Price, $3.00.

This new edition brings the material up to date and gives an excellent idea as to the functions of the nurse in her relations to children. Part I treats of normal growth and development and general hygienic care, including nutrition. One is impressed with the preventive aspects of pediatrics and with the consideration given to mental and emotional development.

Part II describes in systematic manner the general nursing procedures basic to effective nursing. The content is well organized, specific in details, and illustrates the important methods and devices.

Part III is devoted to nursing technics in the diseases of infancy and childhood. It takes up in order the most important diseases of children and brings to bear upon them the most approved methods of treatment from the standpoint of modern pediatrics and pediatric nursing. Suggested references are given at the end of the chapters, and a list of play materials and books suitable for children at various age levels completes the volume. The format of the book is excellent and it is bound in attractive semi-flexible covers.

RICHARD A. BOLT

William B. Wherry—Bacteriologist—*By Martin Fischer. Springfield, Ill.: Thomas,* 1938. 294 pp. Price, $4.00.

This biography, printed for private distribution, represents a labor of love designed to perpetuate the memory of one who was a modest, kindly, Christian gentleman and a scientist of the purest integrity.

The life of the man is sketched by Professor Fischer from the cradle to the grave; the author evidently had access to private records for data which otherwise would not have been available.

The reviewer is concerned here only with the medical and scientific elements of Wherry's career; he came under the influence of Ludvig Hektoen, Theobald Smith, and Edwin O. Jordan early in his professional life, and naturally much was expected of the young man. The work of Wherry in the Philippines, in Montana, in California, in Cincinnati and elsewhere is all sketched in with suitable quotations from letters written to him or by him as well as with references to published material.

His discovery of plague infection among California ground squirrels is set forth at some length and given the importance it deserves. To complete the history it may be proper to add that Rupert Blue, who later became the Surgeon General of the U. S. Public Health Service, had long been convinced on epidemiological grounds that plague was present among the ground squirrels of California and that occasionally human infections came from that source. Fischer seems to criticise the lack of effective action that might have been taken upon the discovery of plague among ground squirrels; at first glance such an attitude seems justified, but subsequent developments leave one in doubt as to whether anything useful could have been accomplished in the way of suppressing what we currently speak of as "sylvatic plague"; experience has taught us a great deal during the intervening thirty years.

Wherry's discovery of the etiologic

nature of the human disease entity we now know as Tularaemia, and his addition of a new host (the rabbit)—perhaps the most important host from the point of view of clinical medicine—are clearly set forth.

Apparently, in spite of a meticulously careful technic, Wherry was not to escape the common fate of those who carry on investigations on *Bacterium tularense* in the laboratory; he almost certainly acquired the infection.

Fischer does not bring out quite so clearly as might have been expected Wherry's attitude toward superficial scientific workers; the kindest designation he had for such was "pseudo-scientists."

Wherry was constantly being distracted by offers of teaching and research positions but he never allowed himself to be guided by any consideration other than the possible opportunities for rendering greater service in the advance of medical science. Viewed superficially, many offers might seem to have been more promising than the one he elected to accept or retain, but always his sure insight guided him well in making his decisions.

We can share Fischer's admiration for Wherry and his achievements without necessarily accepting all of his published work as convincing; for example, we believe too much importance is attached to the work on the cultivation of the leprosy bacillus, and to the treatment of typhoid fever with a vaccine.

Wherry's more important fields of work are well known, but the book furnishes a complete bibliography. The sum total of his important research is very creditable and becomes even more so when one appreciates the physical handicap (cardiac) under which the man worked for at least the last 40 years of his life.

One who stood with Wherry by the bedside of patients suffering from plague, cholera, or other tropical diseases, opposite him at the autopsy table in the San Lazaro Hospital in Manila, who worked by his side in the laboratory at San Francisco and later in the Hygienic Laboratory (now the National Institute of Health) at Washington, D. C., feels that Fischer has rendered a distinct service in making this biography available to the wide circle of Wherry's admirers and friends.

The volume is a notable example of the printer's art, a suitable vehicle for a memorial of such a man as the one whose life is told therein.

GEORGE W. MCCOY

Modern Sewage Disposal—*Langdon Pearse, Editor. New York: Federation of Sewage Works Associations,* 1938. 371 pp. Price, $2.50 to *Sewage Works Journal* subscribers; $3.50 to others.

The attempt to commemorate the tenth anniversary of the founding of the Federation of Sewage Works Associations by publishing a volume containing what might be a report of a convention of the association has resulted in an outstanding contribution to the science of sewage disposal and treatment. Under the experienced editorship of Langdon Pearse and Dr. F. W. Mohlman, both from the Sanitary District of Chicago, the book has attained the position of an authoritative compendium of much that has happened in sewage treatment during its entire development.

Beginning with an introduction by Prof. C. G. Hyde reviewing sewage treatment during the past fifty years in the United States, the volume is subsequently divided into four general sections.

"Sewage Treatment Practice" contains histories and descriptions of all the underlying principles of disposal, the various types of plants developed to utilize these principles and the

appurtenances added to perfect the operation of these plants.

"Sewage Research" describes the problems to be solved and the personnel, methods, and equipment for doing this. The bibliographies in this section are outstanding for their complete coverage of this subject.

Under "Regional and National Aspects," sewage disposal methods in Great Britain, England, South Africa, the Netherlands, and Germany are described.

In "Industrial Wastes" the effects of this waste on sewage treatment and the tremendous problems involved are presented.

Each of these four sections is divided into 31 topics which are discussed by the outstanding authorities of the world. This, together with the fact that each topic is carefully written, makes adverse criticism improbable. Many papers are completed with excellent bibliographies.

Not only will this volume serve as a reference for historical research in sanitary engineering, but it could, at the present time, serve admirably as a text on sewage disposal and as a disposal plant operator's manual.

F. J. MAIER

Research and Statistical Methodology: Books and Reviews, 1933–1938—*Oscar Krisen Buros, Editor. New Brunswick, N. J.: Rutgers University Press,* 1938. 100 pp. Price, $1.25.

This publication is a compendium of reviews of statistical literature published from January 1, 1933, to November 15, 1938. Books are classified under three separate indices (a) professional field, (b) titles, and (c) authors and reviews.

Listed under "Medical and Vital Statistics" are books by Davenport and Ekas; Elderton; Fisher and Yates; Mainland; and Hill. Unfortunately during the period covered few books on vital statistics have been written and the publications covered are not indicative of the texts currently in use. Publications such as Pearl's *Medical Biometry and Statistics* (1930), Newsholme's *Vital Statistics* (1924) deserve mention. These might well have been included in a supplementary list with back publications for other fields.

The work fills a definite need as a guide to recent statistical literature and should prove of particular interest to statisticians and educators.

LOUIS FELDMAN

Sir Thomas Roddick—*By H. E. MacDermot, M.D. Toronto: Macmillan Company of Canada,* 1938. 160 pp. Price, $2.00.

Sir Thomas Roddick is, without question, one of the outstanding figures in the medical life of Canada. Born in 1846, in Newfoundland, he secured his early education in that country and, later on, in Nova Scotia. He came to McGill University for his medical studies and was graduated in 1868.

His biography, as presented by Dr. H. E. MacDermot, a recognized medical historian, is divided into three sections. The first covers the introduction of antiseptic surgery, in which Roddick played a leading rôle. The second deals with his military career as Chief of Medical Staff in the Field during the Riel Rebellion in 1885. The third section describes Roddick's part in the securing of "The Canada Medical Act," which achieved certain national uniformity in medical licensure without interfering with provincial rights.

Dr. MacDermot has told this story of Canadian Medicine in a simple, readable, and entertaining manner. While Roddick naturally dominates the theme, around his figure are pictured the important happenings of his day, not only medical, but political and social as well. Of particular value are the recorded comments of those who

were younger contemporaries of Roddick and who are still active members of society.

The book will have an appeal for public health workers as Roddick taught Hygiene in the Faculty of Medicine at McGill University. They will be interested too in the recital of the application of Lister's methods in surgery, and of the various problems in hygiene which Roddick faced in the Riel Rebellion. GRANT FLEMING

BOOKS RECEIVED

A POCKET MEDICAL DICTIONARY. Compiled by Lois Oakes and assisted by Thomas B. Davie. (3rd ed.) Philadelphia: Reilly, 1938. 397 pp. Price, $1.00.

BACKGROUND TO MODERN SCIENCE. Ten Lectures at Cambridge Arranged by the History of Science Committee. Edited by Joseph Needham and Walter Pagel. New York: Macmillan, 1938. 243 pp. Price, $2.00.

MANUAL OF TOXICOLOGY. By Forrest R. Davison. New York: Hoeber, 1939. 241 pp. Price, $2.50.

THE ANAEROBIC BACTERIA AND THEIR ACTIVITIES IN NATURE AND DISEASES, A SUBJECT BIBLIOGRAPHY. By Elizabeth McCoy and L. S. McClung. Berkeley: California Press, 1939. 2 Vols. $10.00.

MEDICAL ENTOMOLOGY, WITH SPECIAL REFERENCE TO THE HEALTH AND WELL-BEING OF MAN AND ANIMALS. By William B. Herms. Second edition of Medical and Veterinary Entomology. New York: Macmillan, 1939. 582 pp. Price, $5.50.

COMMUNITY HEALTH ORGANIZATION. Edited by Ira V. Hiscock. (3d ed.) New York. Commonwealth, 1939. 318 pp. Price, $2.50.

YOU'RE THE DOCTOR. By Victor Heiser. New York: Norton, 1939. 300 pp. Price, $2.50.

A GIRL GROWS UP. By Ruth Fedder. New York: McGraw-Hill, 1939. 235 pp. Price, $1.75.

GETTING READY TO BE A FATHER. By Hazel Corbin. New York: Macmillan, 1939. 48 pp. Price, $1.25.

TEXTBOOK OF HEALTHFUL LIVING. By Harold S. Diehl. (2d ed.) New York: McGraw-Hill, 1939. 634 pp. Price, $2.50.

IT'S MORE FUN TO BE THIN. By Jean Z. Owen. Boston: Marshall Jones, 1939. 181 pp. Price, $2.00.

PRINCIPLES OF MEDICAL STATISTICS. By A. Bradford Hill. (2d ed.) London: *Lancet*, 1939. 189 pp. Price, $2.25.

PROCEEDINGS OF A CONFERENCE ON THE EDUCATIONAL PRODUCTION OF MOTION PICTURES. The Ohio State University, November 22–23, 1938. Columbus: Bureau of Educational Research, Ohio State University, 1939. 120 pp.

APPARATUS FOR ELECTROLYTIC CONDUCTIVITY MEASUREMENTS IN LABORATORY AND PLANT. Catalog EN-95, 1939. Philadelphia: Leeds & Northrup Co., 1939.

BUDGE ON TENNIS. By J. Donald Budge. New York: Prentice-Hall, 1939. 180 pp. Price, $2.00.

GANDHI TRIUMPHANT. The Inside Story of the Historic Fast. By Haridas T. Muzumdar. New York: Universal Publishing Co., 1939. 103 pp. Price, $1.00.

TOWARD A HEALTHY AMERICA. By Paul de Kruif. New York: Public Affairs Committee, 1939. 32 pp. Price, $.10.

A DOCTOR FOR THE PEOPLE. By Michael A. Shadid. New York: Vanguard, 1939. 277 pp. Price, $2.50.

FACTS ABOUT CURRENT ENGLISH USAGE. By Albert H. Marckwardt and Fred Walcott. New York: Appleton, 1938. 144 pp. Price, $.90.

WHAT IT MEANS TO BE A DOCTOR. By Dwight Anderson. New York: Public Relations Bureau, 1939. 87 pp. Price, $1.00.

TUBERCULOSIS SANATORIUM PLANNING. New York: National Tuberculosis Association, 1939. 46 pp. Price, $.50.

HANDBOOK ON TUBERCULOSIS FOR PUBLIC HEALTH NURSES. By Violet H. Hodgson. New York: National Tuberculosis Association, 1939. 92 pp. Price, $.50.

THE TREATMENT OF TUBERCULOSIS IN GENERAL HOSPITALS. New York: National Tuberculosis Association, 1939. 14 pp. Apply.

SPORTS FOR THE HANDICAPPED. By George T. Stafford. New York: Prentice-Hall, 1939. 302 pp. Price, $2.50.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Causes of Improvement Analyzed—For a 20 year period ending in 1931, there was no demonstrable downward trend in Cleveland's high puerperal mortality rate. Since then the rate has gone from over seven to about three. That the decline in other cities should be similarly studied and analyzed all will agree.

BOLT, R. A. Reduction of Maternal Mortality in Cleveland. J.A.M.A. 112, 16:1543 (Apr. 22), 1939.

Immunity to Tuberculosis—Wishful thinking that childhood infection with tuberculosis immunizes against later breakdowns from reinfection finds no support in this follow-up study of children tested with tuberculin. The ratio of later deaths among reactors and among negatives is 38 to 1.

CH'IU, P. T. Y., *et al.* The Fate of Children with Primary Tuberculosis. J.A.M.A. 112, 14:1306 (Apr. 8), 1939.

Responsibility for Milk Safeguards—Every state health department should employ at least one sanitary engineer full time on milk supervision. No pasteurization plant should be constructed and no equipment installed or modified without the approval of the milk sanitation engineer. This official should have adequate training, which many have not had. The reasons for the eminently sound proposals are set forth in convincing array.

FRANK, L. C. Engineering Problems in Milk Sanitation. Pub. Health Rep. 54, 13: 513 (Mar. 31), 1939.

Blonds, TB, and Vitamin A—More than half the tuberculous persons tested gave evidence of vitamin A deficiency, and the extent of this deficiency paralleled the severity of the tuberculosis infection. Observations of "normal" blonds and brunettes are also recorded.

GETZ, H. R., *et al.* Vitamin A Deficiency in Normal and Tuberculous Persons. J.A.M.A. 112, 14:1308 (Apr. 8), 1939.

Is This New to America?—A diphtheria scratch test similar to the von Pirquet was found specific for the disease. It has the advantages of simpler technic, requiring no syringe, is less time consuming, and slightly more sensitive.

GROZIN, M. Diphtheria Scratch Test. Am. J. Dis. Child. 57, 3:564 (Mar.), 1939.

Another Reason for Goiter Prophylaxis—Statistical evidence is presented which again suggests a relation between goiter and cancer. Therefore iodine prophylaxis, together with desiccated thyroid for the aged, may be a precaution worth taking from the standpoint of cancer also.

MCCLENDON, J. F. The Statistical Relation Between Goitre and Cancer. Am. J. Cancer. 35, 4:554 (Apr.), 1939.

Basis of Sanitation—Varying degrees of participation by federal, state, and local health agencies in the sanitary engineering program are discussed and the conclusion is reached that though expansion in many state divisions is needed, the great weakness is in local units.

MCLAUGHLIN, A. J. A Basic Program of Sanitation. Health Officer. 3,12:411 (Apr.), 1939.

Confession Still Good for the Soul—It is difficult to believe, write these authors, that, for all our success in early diagnosis, improved facilities for

treatment, and progressive education, the death rates can be so high (among high school students with tuberculosis), that our case control can be so poor, and that deaths are greater among incipient than among advanced cases.

NOVAK, J. B., and KRUGLICK, J. S. End Result of a Tuberculosis Case-Finding Project. J.A.M.A. 112, 5:1452 (Apr. 15), 1939.

Modern Health Crusade—Words of wisdom about health education, ending with this: if we really believed in the importance and value of health education, much more of it would be carried out! While lip service to prevention is common, every official knows how much harder it is to carry through a preventive scheme than to secure support for remedial work.

SAVAGE, W. The Media and Organization of Health Education. J. Roy. San. Inst. 2, 4:256 (Apr.), 1939.

Fertile Health Exhibit Ideas—Some of the newer technics found useful at the New York Museum of Science and Industry are these: spotlighted demonstrations; scientific side-shows to high-spot features and give variety; tie-up of scientific exhibit with appropriate subjects running in the commercial movie houses; luring various groups by movie "screen tests" of golf stroke, or demonstration of some special scientific technic. This limited list should convince you of the value of this paper, but there is a lot more.

SHAW, R. P. New Developments in Scientific Museum Techniques and Procedures. Sci. Month. 48, 5:443 (May), 1939.

Well-Fed Mothers-to-Be—Optimal diet for pregnancy should include fruit, eggs (3), milk (1 qt.), meat, vegetables, butter (with other foods added to give sufficient calories), at least 3 grains of ferrous sulphate and 800 units of vitamin D. The requirement of food factors for optimal nutrition are set forth in a useful table, and there is much more of interest to maternal hygienists.

STRAUSS, M. B. Nutritional Requirements and Deficiencies in Pregnancy. J. Am. Dietet. A. 15, 4:231 (Apr.), 1939.

Scarlet Fever Immunization and Rash—Active immunization with scarlatinal streptococcus toxin which changed the positive Dick test to negative had no demonstrable effect upon certain immunological properties of the blood toward streptococci. The author does not comment on these findings in a study to determine the expected benefits from immunization against scarlet fever, but one may arrive at some assumptions of his own by reading the whole paper.

STRUMIA, M. M. Immunologic Studies in Active Vaccination Against Scarlet Fever. J. Immunol. 36, 4:301 (Apr.), 1939.

Do Second Attacks of Polio Occur?—Experiments are reported upon monkeys recovered from poliomyelitis and reinfected with material from acute measles cases. New paralysis developing without the typical inflammatory changes of polio suggests that supposedly second attacks of the latter disease in humans may be due to some other infection.

TOOMEY, J. A., and WEAVER, H. M. Experimental Paralysis in Monkeys Completely Recovered from Poliomyelitis. Am. J. Dis. Child. 57, 3:541 (Mar.), 1939.

We Have Enough Bugs of Our Own—Listed are the 650 assorted insects: mosquitoes, flies, beetles, wasps, ants, moths, cock roaches, and chinch bugs, brought into the U. S. on airplanes from South and Central American ports.

WELCH, E. V. Insects Found on Aircraft at Miami, Florida, in 1938. Pub. Health Rep. 54, 14:561 (Apr. 7), 1939.

Brains, Courage, Money, Patience Needed—Striking and useful are these statistics: half of the venereal infections are acquired innocently: half the

syphilis infections are acquired in the 20 to 30 year age group: the sex ratio is 3 men to each 2 women. One in every 12 pregnant women (in 15 city clinics) had syphilis. It costs the country 50 million dollars each year to keep the paretics in the comfort to which they are accustomed!

WILBUR, R. L. Social Hygiene—A Task of All the People. J. Social Hyg. 25, 3:113 (Mar.), 1939.

Reference Item—The work of each of the divisions of the Canadian National Health Section is described. The organization is much like that of the U. S. Public Health Service, it would seem.

WODEHOUSE, R. E., *et al.* The Health Section of the Department of Pensions and National Health, Canada. Canad. Pub. Health J. 30, 3:119 (Mar.), 1939.

How Much Maternal Care?—Every patient should be examined at the end of the lying-in period, from 10 to 14 days after delivery. In normal cases a second examination should be made at the clinic 6 weeks after delivery. What should be done at each is set forth by this British authority. These suggestions would improve some post-natal practice hereabouts.

WOOD, J. L. M. The Scope of the Post-Natal Examination. Pub. Health. 52, 7:197 (Apr.), 1937.

ASSOCIATION NEWS

A Statement of the Position of the American Public Health Association with Reference to the National Health Bill of 1939 (S. 1620)

as made by Abel Wolman, Dr.Eng., President of the Association, before the Senate Committee on Education and Labor, May 4, 1939

THE American Public Health Association has approved in principle the major aspects of the National Health Program and has directed a committee to lend the assistance of this professional society of public health workers in order that these principles may be translated into effective action.

The National Health Bill of 1939 has been studiously compared in detail with the principles declared by the Association as desirable or requisite for such a document. We conclude that, with but one major exception, this effort to implement the National Health Program meets the conditions published by the Association.

The Association approves the evidences of effective interest of the federal government in the health of the nation.

We accept the proofs presented again and again that large areas of our country do not have the benefits of adequate health service.

We believe that state health departments and local health agencies are necessary to provide indispensable services.

We specifically endorse the recommendations of the Technical Committee on Medical Care as they provide for (1) expansion of public health services including maternity and infancy, (2) expansion of hospital facilities both general and special, (3) provision of essential medical, hospital, and nursing care as required to persons unable to support such care from their own resources, (4) compensation against wage loss through sickness.

We are gratified to find these four recommendations all embodied in the Wagner Bill.

We believe that wide latitude should be allowed the states in the definition of the population to be served and the method of providing medical services. Here again we note that the Wagner Bill agrees.

We believe that these benefits should be provided for the whole population, and are pleased to note that the National Health Act of 1939 specifies that a plan to provide state-wide coverage at once or in not more than 6 years must be submitted in order for a state to qualify for federal aid.

We further believe that the primary federal function in this field is to give financial and technical aid to states for approved programs. We note that the Wagner Bill does not depart from this primary function.

We believe that it is desirable that a single state agency, the health department, should be administratively responsible for all the provisions of the National Health Program. We note that the Wagner Bill agrees in general, except on the administrative responsibility of the disability compensation provisions.

We believe that the state health department can provide better personnel and maintain higher standards for these services than any other state

agency. We find no apparent disagreement with this position in the Bill.

We believe that qualified advice will be requisite from several professional groups concerned. We note that it is provided for in the Bill, though in a somewhat cumbersome fashion.

We believe that increased funds for training purposes will be essential, and we note that these are provided in the Bill.

We believe that the program should be developed around and based upon existing preventive health services, and we find provisions to this effect in the Act.

We believe that wide latitude must be given to the states in defining not only the population to be served and in the selection of the method of providing medical service but also in the method of raising funds in the states. We believe this latitude is embodied in the Wagner Act.

We believe that the fundamental objectives of this program are, first, the conservation of health and vitality and, second, the reduction of the rôle of sickness as a cause of poverty and dependency. We find no disagreement with these objectives in the Wagner Act.

We believe that the expansion of public health and maternal and child health services, the expansion of hospital, clinic, and other institutional facilities, and the provision of medical care for the medically needy should have priority in initiation. We assume that under the Bill as proposed the states are left with discretion sufficient to choose the items to be developed and the order in which they will be begun.

We believe that the existing provisions for state aid under the Social Security Act constitute a good framework for expansion, and we note that the Wagner Act is an amendment and an expansion of the Social Security Act.

We believe that state programs in order to be approved must provide for the maintenance of high personnel standards, and we believe that federal aid should be withheld on substandard services. The concurrence of the National Health Bill is noted with approval.

We believe that federal authorities should have power to establish minimum standards after consultation with competent advisory bodies. Again we note agreement of the Wagner Act.

We believe that federal aid should be conditioned on the inclusion in the state plans of adequate safeguards for standards in general, and this we find included in the Wagner Act.

We believe that the extension and improvement of public health services requires the integration of health services at the federal level under one cabinet officer, preferably a Secretary of Health.

We note here a major divergence in the draft of the National Health Act of 1939 which makes the Children's Bureau responsible for maternal, infant, child hygiene, and crippled children's services, whereas the U. S. Public Health Service is to be responsible for general public health work, for investigation, and for hospitals and health centers, and the Social Security Board is to be responsible for the medical care features and for disability compensation.

In this connection we have noted with interest that the recent reorganization order transfers the U. S. Public Health Service and the Social Security Board to a new independent agency without Cabinet representation. No clear provisions for coördination are made. This may therefore be consolidation without coördination, particularly since the Children's Bureau is left in the Department of Labor and various other federal agencies such as the medical service of the Indian Service are left where they are.

It is therefore apparent that the Wagner Act meets the recommendations

of the American Public Health Association in practically all respects excepting the failure to make a single federal agency responsible for all features of the Act. In this respect the National Health Act of 1939 even further complicates the federal administration of health services by imposing upon the Social Security Board a new responsibility for which it now has neither staff nor experience.

It is further noted that although advisory councils are requisite both at the federal and state level, the provisions as made by Sections 503, 513, 603, 1203, 1206, and 1303 will require a total of about 262 separate councils. We believe that these are too numerous and unwieldy. It would perhaps suffice to provide for one council to each federal agency responsible under this Act and for one council to each state agency chosen for state responsibilities. This would reduce the number probably to less than one hundred. Nevertheless, the membership, the duties and the responsibilities of these councils are still vague. We believe that these details of advisory councils, their number and their duties and responsibilities are matters that can well be cleared in conference.

With the above exceptions we believe that the National Health Act of 1939 can be approved as a device to implement the National Health Program.

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Samuel D. Allison, M.D., 2706 N.E. Clickitat St., Portland, Ore., Director, Division of Venereal Disease Control, Oregon State Board of Health

Helen Baldwin, M.D., Canterbury, Conn., Public Health Officer

Edward B. Bukowski, M.D., C.P.H., 806 Fillmore Ave., Buffalo, N. Y., Assistant Director, Syphilis Control Program, City Health Dept.

Jack A. Crittenden, M.D., Elba, Ala., Health Officer, Coffee County Health Dept.

Samuel S. Farago, M.D., Ph.B., 101 West Broad St., Westerly, R. I., Health Officer

William Y. Garrett, M.D., Eastville, Va., Health Officer, Northampton County Health Dept.

Theodore A. Jost, M.D., City Hall, Mount Vernon, N. Y., Commissioner of Public Health

William L. Lockman, M.D., Julian, Calif., Physician, U. S. Indian Service

L. Archibald MacLean, M.D., Box 180, Red Deer, Alberta, Sask., Canada, Medical Health Officer

Cornelius M. Mills, M.D., C.P.H., 303 State Bldg., San Francisco, Calif., Chief, Crippled Children's Services, State Dept. of Public Health

Emil E. Palmquist, M.D., 543 East 91 St., Seattle, Wash., Health Officer

Harold H. Whitted, M.D., State Dept. of Public Health, Montgomery, Ala., Acting Assistant Surgeon, Division of Venereal Diseases, U. S. Public Health Service

Laboratory Section

Gladys Anthony, A.B., Box 217, Grand Junction, Colo., Owner and Director, Anthony Clinical Laboratory

Harold E. Brakewood, A.B., National Folding Box Co., New Haven, Conn., Chief Chemist

Elmer F. Chaffee, 1317 Alturas St., Boise, Idaho, Laboratory Technician, Idaho Division of Public Health

William A. Dunlap, M.A., District Laboratory 1, State Board of Health, Parsons, Kans., Bacteriologist in Charge

Jules Freund, M.D., C.P.H., Bureau of Laboratories, New York City Dept. of Health, Otisville, N. Y., Assistant Director

Arthur W. Hayes, Route 1, Box 5753, Sacramento, Calif. Market Milk Specialist, California State Dept. of Agriculture

Maxwell L. Littman, Ph.D., 108 Goodwin Ave., Newark, N. J., Sanitary Chemist and Bacteriologist. Dept. of Water Supplies and Sewage Disposals, New Jersey Agricultural Experiment Station

Mary H. Rankin, B.A., 501 Texas Ave., Austin, Tex., Laboratory Technician, Texas Bureau of Laboratories

Mary E. Tenney, M.A., 1208 South 8 St., Sheboygan, Wis., Supervisor, State Cooperative Laboratory of Hygiene

John L. Wilson, Ph.D., 914 Guardian Bldg., St. Paul, Minn., Research Director, Economics Laboratory, Inc.

Vital Statistics Section

Henry K. Beye, A.B., 2211 Quincy St., Bakersfield, Calif., Statistician, Kern County Dept. of Health

Margaret E. Graff, A.B., 82 Washington Ave., Albany, N. Y., Assistant Statistician, New York State Dept. of Health

Jules V. Quint, B.S., 1 Madison Ave., New York, N. Y., Assistant to Supervisor of Occupation Ratings and Accident Statistics, Metropolitan Life Insurance Co.

Public Health Engineering Section

Charles S. Brown, P. O. Box 684, Chapel Hill, N. C., Trainee Sanitarian, Georgia Dept. of Public Health

Louis H. Herschler, B. of C.E., Plague Laboratory, Kahului, Maui, T. H., Sanitary Engineer

Walter C. Janson, A.B., M.S.P.H., 294 N. Village Ave., Rockville Centre, L. I., N. Y., Student

Clarence R. Jones, B.S.Agr., C.P.H., Harrison County Health Dept., Clarksburg, W. Va., District Milk Inspector

Carl E. Schwob, M.S., 1800 West Fillmore St., Chicago, Ill., Senior Assistant Sanitary Engineer, State Dept. of Public Health

Percy A. Shaw, B.S., in C.E., Manchester Water Works, Manchester, N. H., Engineer Member, State Board of Health

Rodney L. Small, County Health Unit, Lewiston, Idaho, Sanitarian, Idaho North Central Health Unit

Industrial Hygiene Section

Harold W. Ruf, Ph.D., State Office Bldg., Madison, Wis., Industrial Sanitary Engineer, Industrial Hygiene Unit, State Dept. of Health

Food and Nutrition Section

Howard J. Cannon, A.B., 1411 East 60 St., Chicago, Ill., Director, Laboratory of Vitamin Technology

Louis S. Fridericia, M.D., Blegdamsvej 21, Copenhagen, Denmark, Professor of Public Health, University of Copenhagen

Jean M. Stewart, M.A., Agricultural Extension Service, University of Arizona, Tucson, Ariz., Extension Nutritionist

Child Hygiene Section

Harry L. Clark, M.D., 353 Ocean Ave., Brooklyn, N. Y., Obstetrician and Gynecologist

Alexander A. Cozzalio, D.D.S., 318 First National Bank Bldg., Reno, Nev.

Harry S. Mackler, M.D., 590 West End Ave., New York, N. Y., Pediatrician, Foster Home Bureau, Hebrew Sheltering Guardian Society

Public Health Education Section

Dwight M. Bissell, M.D., C.P.H., Monterey County Hospital, Salinas, Calif., Health Officer and Assistant Medical Director

Mrs. Almeda Chandler, 5 Town Square, Plymouth, Mass., Clerk, Board of Health

Donald K. Freedman, M.D., 522 East 88 St., New York, N. Y., Associated Hospital Service of New York

Wilfred F. Kruse, M.S., 1028 Bonnie Brae, River Forest, Ill., Instructor in Public Health, Concordia Teachers College

Public Health Education Section

Ethel Mealey, M.S., State Board of Health, Portland, Ore., Director of Health Education

Mrs. Geneva F. Rockford, R.N., Memorial Hall, Northampton, Mass., Field Nurse and Executive Secretary, Hampshire County Public Health Assn.

Gerald A. Spencer, M.D., D.P.H., 2135 Seventh Ave., New York, N. Y.

Martha Van Meter, M.A., 583 Broadway, Gary, Ind., Executive Secretary of Lake County Tuberculosis Assn.

Public Health Nursing Section

Alma A. Carlson, Mountain Village, Alaska, Field Nurse, U. S. Office of Indian Affairs

Edith J. Dautremont, R.N., Taholah Indian Agency, Hoquiam, Wash., Field Nurse

Helen F. Dunn, B.S., 1812 K Street, N.W., Washington, D. C., Assistant Director of Nursing, American Red Cross

Nan M. Gallagher, R.N., Kanakanak, Alaska, Field Nurse, U. S. Office of Indian Affairs

Margaret C. Joyce, R.N., 85 North Broadway, White Plains, N. Y., Field Secretary, Westchester Tuberculosis and Health Assn.

Mrs. Hope Newell, R.N., 110 West 94 St., New York, N. Y., Maternity Supervisor, Henry Street Visiting Nurse Service

Lillian I. Peterson, R.N., 1419 Schilling St., Chicago Heights, Ill., Public Health Nurse,

Tuberculosis Institute of Chicago and Cook County

Mary A. Reber, R.N., C.P.H., 266 Blue Lakes North, Twin Falls, Idaho, Staff Nurse, South Central District Health Unit

Harriet C. Russell, R.N., Jerome, Idaho, Staff Nurse, South Central District Health Unit

Eva G. Schwitzer, R.N., 723 Main East, Twin Falls, Idaho, Staff Nurse, South Central District Health Unit

Unaffiliated

John Campbell, Board of Health, Hilo, Hawaii, Junior Sanitary Inspector

Arthur E. O'Neill, D.D.S., P. O. Box 108, Redwood City, Calif., Chairman, Board of Health and Welfare, San Mateo County

Max. A. Pleasure, D.D.S., 6250 Saunders St., Rego Park, L. I., N. Y., Dentist, New York City Dept. of Health

DECEASED MEMBERS

Robert L. Frisbie, M.D., Rhinelander, Wis., Elected Member 1937

Clarence D. Hart, M.D., Savannah, Ga., Elected Fellow 1923, Elected Member 1918

Jacob G. Lipman, Ph.D., New Brunswick, N. J., Elected Member 1915, Elected Fellow 1923

Gustave A. Ootman. M.D., Kelowna, B. C., Canada, Elected Member 1935

William H. Park, M.D., New York, N. Y., Elected Member 1912, Elected Fellow 1923

Evart G. Routzahn, New York, N. Y., Elected Member 1912, Elected Fellow 1923

Charlotte A. Stickney, M.D., St. Paul, Minn., Elected Member 1938

Grace Van Doorn, B.A., Milwaukee, Wis., Elected Member 1926

A.P.H.A. WORLD'S FAIR EXHIBIT

ADDITIONAL contributors to the exhibit on Public Health Administration which the Association is sponsoring at the New York World's Fair are as follows:

Dr. Marion Shepard
Dr. Garland L. Weidner
Susan M. Wood

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

Positions Wanted

HEALTH OFFICERS

Unusually well qualified and experienced administrator, M.D., Johns Hopkins; M.P.H., Harvard; with broad experience in administering programs of medical care, is available. **A404**

Physician, M.D., class A medical school; M.S.P.H., University of Michigan, 1939; 10 years' experience in administrative full-time health programs; seeks position in public health administrative position. **A373**

Physician, M.D., University of Cincinnati; with postgraduate training in venereal disease control, Johns Hopkins; is available as venereal disease control officer. **A363**

Physician with M.P.H. from Harvard, experienced as epidemiologist and in health administration, also in communicable diseases at state level, seeks responsible position. **A392**

Physician, M.D., class A medical school; 12 years' full-time public health experience; now employed with state department of health; will consider opening with well organized city or state department in communicable disease division or epidemiology or both. Mid-west preferred. **A409**

Physician, M.D., Yale; M.S.P.H., Columbia; also short course for health officers, Vanderbilt; good clinical background; one year public health experience; will consider appointment in child health, epidemiology or public health administration. **A350**

Physician, M.D., Syracuse University; postgraduate studies in bacteriology and immunology, will consider position as health officer or epidemiologist. Has served as director of county health unit, director of industrial hygiene and medical statistics and venereal disease field survey officer. **A305**

Physician, aged 39; M.D. and Dr.P.H., Yale University; with excellent training in medicine, pediatrics and epidemiology, now specializing in public health education, will consider appointment in health education or administration. **A366**

Physician, M.D., Columbia; experienced as county health officer and superintendent of health, seeks position in public health administration or medical executive work. **A396**

Physician, M.D., Johns Hopkins; M.S.P.H., University of Michigan; experienced in school and city health work; for the past year director of county health department, seeks position as health director of city school system or in health service of a college or university. Will also consider position as epidemiologist or health officer in urban health department. **A354**

Physician, M.P.H., Harvard, well experienced in city and rural health administration, will consider appointment as district health officer or in city or state health department. **A418**

HEALTH EDUCATION

Young woman, Ph.D., Columbia University, splendid background of experience in health education, will consider position as director of public health education. **H294**

Well qualified woman in health education wishes position as health coördinator or health counselor. Has wide experience, and Ph.D. from New York University. **H236**

Young woman, M.A., Health Education, Teachers College, Columbia University; with splendid international experience, seeks position as director of health education. **H369**

Young woman, experienced teacher in health education, with M.S. in Public Health and Hygiene from University of Michigan, seeks position as health coördinator. **H398**

Experienced director of health education, R.N. and college graduate, with excellent references, will consider health education or promotional position. **H408**

LABORATORY

Experienced laboratory director with background of dairy products manufacture and research in control methods; University of Wisconsin, M.S. and Ph.D., desires administrative position with food manufacturing or processing industry, or association with health department doing routine and research work in food control. **L381**

Experienced woman bacteriologist, Ph.D., University of Illinois, 1937, wishes position in teaching or research. Excellent bibliography and references. **L410**

Physician, M.D., Northwestern; Dr.P.H., Johns Hopkins; broad experience in laboratory, teaching and epidemiological fields, will consider temporary position for summer, preferably in parasitology. **M293**

Capable research worker, Ph.D., trained at University of Southern California and Pasteur Institute, seeks position directing laboratory, in research work or field investigation. Has taught bacteriology, directed state hygiene laboratory and hospital laboratories. **L315**

Chemist and bacteriologist experienced in water supply, sewage, and public health laboratory work. Five years' experience. B.S., 1933. Desires work in sanitation or general public health. **L412**

Bacteriologist and serologist, A.B., University of Wisconsin, at present bacteriologist in state public health laboratory, will consider another position. **L416**

MISCELLANEOUS

Dentist, graduate of Temple University, with excellent postgraduate experience, desires position in administrative aspects of dental hygiene. **M352**

Physician, M.D., class A medical school; training in obstetrics and public health. Experienced as director of county health department, teacher of clinical obstetrics and administrator of state maternal and child health program, desires position in public health obstetrics or in maternal and child health administration. **C417**

Public health engineer, B.S. in Sanitary Engineering, University of California, 1937. Now completing training for C.P.H. in Public Health Engineering, University of California. Well trained in sanitation and other activities, including public health administration, health education, etc. Desires position as sanitary or public health engineer in municipal, county or state health department. **E413**

Positions Available

SCHOOL NURSE—Public health nurse with degree for interesting position with public schools in town of 65,000; midwest. PH-60, Medical Bureau, Pittsfield Building, Chicago.

CAMP NURSE—Boys' camp; Wisconsin; July and August; preferably school nurse who can take position each summer. PH-61, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH NURSE—City health department; preferably someone with some orthopedic training; considerable traveling. PH-62, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH NURSE—For position of assistant supervisor of nurses, city health department; graduate of scholastic work in public health and field work required; department carries on generalized public health nursing service; midwest; 4 month course in public health nursing and year of public health nursing under supervision required. PH-63, Medical Bureau, Pittsfield Building, Chicago.

SCHOOL NURSE—School system of small Colorado town; experience essential; $1,200–$1,500. PH-64, Medical Bureau, Pittsfield Building, Chicago.

ASSISTANT HEALTH COMMISSIONER—Physician, 35–40, with C.P.H. or M.P.H. and several years' experience; important southern city; vicinity $5,000. PH-65, Medical Bureau, Pittsfield Building, Chicago.

STUDENT HEALTH PHYSICIAN—Unusual opportunity for young physician desiring to develop along lines public health work, health teaching; possibility attaining M.P.H. at termination of service; 8 hour day, month's vacation; $2,000, increasing annually; university health service. PH-66, Medical Bureau, Pittsfield Building, Chicago.

Positions Wanted

PUBLIC HEALTH NURSE—B.S. degree; graduate of one of country's leading training schools; postgraduate training in public health and hygiene, state university; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

BACTERIOLOGIST desires position, preferably in public health laboratories; B.A., eastern school; C.P.H. and Ph.D. (bacteriology), Yale University; has done considerable research; 4 years, bacteriologist and research technician, public health laboratories; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

HEALTH EDUCATOR—Graduate nurse and B.S. degrees; social service certificate; 3 years' experience in social service; 4 years, industrial nursing; 10 years, director of a health council; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH PHYSICIAN desires connection; M.D., Virginia; several years' successful private practice; 10 years' public health work during which time he has been promoted continuously, excellent reason for relocating; for further details please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

NEWS FROM THE FIELD

WHITE HOUSE CONFERENCE ON CHILDREN IN A DEMOCRACY

THE President of the United States has appointed the Honorable Frances Perkins, Secretary of Labor, as Chairman of a White House Conference on Children in a Democracy. Following preliminary work by an informal committee and conference with the President, a Planning Committee was appointed by the Chairman of the Conference to be responsible for its organization and work. This Planning Committee met in Washington on March 14 and planned a meeting on April 26 at the White House for the general organization of the Conference.

In order to provide for a wide representation of professional and lay interests and to secure representation from each state, a committee has been selected of about five hundred with the aim that this might be a working conference.

The first meeting was held in Washington on April 26 at the White House. The speakers included the President of the United States, Mrs. Franklin D. Roosevelt, The Honorable Frances Perkins, Secretary of Labor, Right Rev. Mngr. Robert F. Keegan of New York, the Executive Director of the Catholic Charities of the Archdiocese of New York, and Homer Folks of New York, Secretary of the State Charities Aid Association.

This Conference, which is the fourth White House Conference on this general subject, will hold its final sessions early in 1940—ten years after the last similar Conference.

Katharine F. Lenroot, Executive Secretary of the Conference, has announced that the total membership is now 585, including representatives of every state and of Alaska, Hawaii, Puerto Rico, and the District of Columbia. Attendance at the initial sessions included 410 persons, representing all but two states and Alaska.

Among subjects to be considered by the Conference will be the following:

1. Children and Democracy
   A consideration of the primary objectives of a democratic society in relation to children, the institutions through which a democratic society works for the attainment of these objectives, and the ways in which democracy, through its various institutions, can present to children and youth an intelligent understanding of its goals and ideals.
2. Children and Life in the United States Today
   A consideration of the needs of children under present-day conditions in the United States, the extent to which they are met, and the ways in which they may be supplied more fully.
3. Children and the Future of America
   A summary of the major issues developed under the previous headings, with recommendations which may lead to more complete realization of the objectives of democracy for children and the development in children of capacities for democratic living.

Among those in attendance at the first session were more than 60 Fellows and members of the American Public Health Association.

PUBLIC HEALTH ASSOCIATION OF NEW YORK CITY

THE Third Annual Meeting of the Public Health Association of New York City was held at the Hotel McAlpin May 18.

Speakers at the session on chemotherapy with respect to syphilis and other communicable diseases included Dr. Louise Pearce, of the Rockefeller Institute, and Dr. Reuben Ottenberg, of Mt. Sinai Hospital. On the subject of problems in connection with plans for furnishing medical service to the middle classes of the United States, speakers were: Dr. Michael M. Davis,

Dr. Leo Price, Dr. Haven Emerson, Dr. George T. Palmer, and Bernard S. Coleman.

At the Annual Dinner Meeting, Dr. Louis I. Dublin spoke on the Museum of Health, now included in the Hall of Man, of the Medicine and Public Health Building at the New York World's Fair. The guest of honor at the dinner was Sir William McLean, a member of the British Commission to the World's Fair.

Officers for 1938 were reëlected as follows:

President, Hazel Corbin
First Vice-President, Dr. Arthur I. Blau
Second Vice-President, Dr. George T. Palmer
Secretary-Treasurer, Frank Kiernan

HARVARD SYMPOSIUM ON VIRUS AND RICKETTSIAL DISEASES

IT has been announced, by Dr. C. K. Drinker, Dean of the Harvard School of Public Health, Harvard University, Boston, Mass., that registration for the short course of lectures, clinics and demonstrations on the virus and rickettsial diseases—to be given June 12–17—is still open within the capacity of the course.

An outline of this event was carried in the February issue of the *Journal,* page 193.

SMALLPOX IN NEW YORK STATE

AN outbreak of 13 cases of smallpox in the town of Ripley, Chautauqua County, N. Y., with at least 600 others known to have been exposed to the disease, was announced by Dr. Edward S. Godfrey, Jr., State Commissioner of Health. The Ripley outbreak involves 11 adults and 2 children of 6 families. The first case, occurring April 1, was that of a truck driver who traveled between Syracuse, N. Y., and Cleveland, Ohio. The last case occurred on May 15.

This is the second outbreak in the State within the past three months.

BOVINE MASTITIS STREPTOCOCCI CLASSIFICATIONS

AN international study of the streptococci associated with bovine mastitis has been announced in order to arrive at a more uniform classification. Briefly, it has been decided to ask those who are studying mastitis to reëxamine their cultures (1) by means of a group B standard serum which will be issued, and (2) by certain relatively simple cultural and biochemical methods. Mimeographed copies of suggested methods and the group B serum will be sent to anyone interested.

Persons resident on the American continent and in Japan should write to Dr. R. B. Little, Rockefeller Institute, Princeton, New Jersey; while those in Europe and the British Empire should communicate with Dr. F. C. Minett, Royal Veterinary College, Camden Town, London, N.W.1, England.

PHARMACOPOEIA REVISION

A CALL for a Convention for the Revision of the Pharmacopoeia of the United States, to be held in Washington beginning May 14, 1940, has been issued by Walter A. Bastedo, M.D., of New York, President of the United States Pharmacopoeial Convention.

Dr. Bastedo points out that, under the present Federal Food, Drug and Cosmetic Act, the standards of strength, quality and purity laid down in the Pharmacopoeia for the drugs and preparations that it recognizes automatically become the legal standards for these preparations.

BALTIMORE RAT PROOFING ORDINANCE

AN ordinance has been passed in Baltimore, Md., as part of a rat control program providing for the rat-proofing of all buildings hereafter erected in the city for the protection of public health and to prevent the introduction or spread of rat-borne diseases.

NEW ENGLAND HEALTH INSTITUTE

STATE Departments of Health, State Departments of Education and State Tuberculosis Associations for the six New England states joined with the New England Health Association in putting on a New England Health Education Institute, April 21 and 22, at the Massachusetts Institute of Technology. This is the first time that such agencies have combined in organizing a special professional program in the Health Education Field. Over 600 persons registered for the Institute.

The costs of the Institute were underwritten in part by certain of the participating agencies, but the $1,200 secured from the $2 registration fee made the project practically self-supporting.

The meetings opened with a General Session on Friday morning with a discussion of the "Underlying Psychology for Motivating Health Behavior." On Friday afternoon the practical application of these principles was considered as they apply to the elementary school level, the secondary school level, the college level, and the adult level.

On Saturday 7 separate Sections were held. These sessions dealt with "Educational Aspects of Medical, Dental and Nursing Services in Schools," "Evaluation of Programs," "Types of Measurement in Physical Education Programs," "Problems in Health Service and Health Curriculum in Colleges," "Publicity Methods in Public Health Education," "Health Education in Maternal and Child Welfare," and "Rural Health Education."

A general open meeting on Friday evening was addressed by Dr. Henry F. Vaughan, Dr. H. D. Chope and Dr. Dorothy Nyswander. A Friday luncheon meeting was addressed by Dr. Channing Frothingham, President of the Massachusetts Medical Society, and a Saturday luncheon was addressed by Dr. Howard W. Haggard of Yale University. Seventy-one speakers and discussion leaders participated in the 2 day program.

The Institute was planned and conducted by an Organizing Committee under the chairmanship of Professor C. E. Turner of the Massachusetts Institute of Technology, with Arthur J. Strawson of the Massachusetts Tuberculosis League as Executive Secretary. The members of the Organizing Committee consisted of the officers of the New England Health Education Associations, the State Commissioners of Health, the State Commissioners of Education, and the Executive Officers of the State Tuberculosis Associations or their special representatives. There were sub-committees on arrangements, membership, coöperating agencies, exhibits, finance, program, publicity, and registration.

Any member of the American Public Health Association who is interested in further details of organization may secure a copy of the program by writing to Professor C. E. Turner, at the Massachusetts Institute of Technology, Cambridge.

HENRY STREET VISITING NURSE SERVICE HAS NEW HEADQUARTERS

THE Henry Street Visiting Nurse Service is now located at its new address, 262 Madison Avenue, New York City.

This new building, which will be dedicated in the autumn, replaces the property given to the Nursing Service in 1925 by Mrs. Jacob H. Schiff, located at 99 Park Avenue. Two years ago this building, which for fifteen years had housed the administrative staff, was purchased by the City of New York for a Court House site, making possible another building at the present address, all expenses in the acquisition of which have been defrayed from the proceeds of the sale of 99 Park Avenue.

AMERICAN CONGRESS ON OBSTETRICS PROGRAM

THE program for the American Congress on Obstetrics and Gynecology to be held in Cleveland, Ohio, September 11–15, 1939, has been announced. Copies may be obtained from the Conference office, The Annex, 650 Rush Street, Chicago.

The first day, sessions will be given over to considerations of Public Health and Maternity Care, the second day to Providing Continuity of Maternal Care in the Rural Areas, the third day to Federal and State Programs in Maternal Care, the fourth to the problems of Economics, and the fifth to the problems bearing on Education.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE Summer Meeting of the Section on Medical Sciences of the American Association for the Advancement of Science will be held in collaboration with the American Neisserian Medical Society, in Milwaukee, Wis., July 19–24, 1939.

There will be four scientific sessions devoted respectively to The Biology of the Gonococcus, The Diagnosis of Gonococcal Infection, Therapy and Control, and Sulfanilamide and Related Compounds.

SOME NOTABLE RETIREMENTS

"At this time of year it is always necessary to bid farewell, in their official capacity, to some senior members of the public health service. This year brings some especially noteworthy partings. . . .

The same applies to our other Past-President, Dr. Charles Porter, who gave up his post at St. Marylebone on March 15th, after nearly 30 years of service to his borough. Dr. Porter has been so eminent a figure in the work of the Society both as a Branch Secretary, as a member of the Council, as President, and last, but by no means least, as Honorary Editor of *Public Health* for ten years, until 1936, that any tribute we pay would fall short of adequacy. We feel sure that he will continue to make himself felt in the world of public health and that his activity will remain unabated. . . ."—Editorial, *Public Health* (London), April, 1939.

PERSONALS

Central States

ERVIN J. BRENNER, M.D.,† of Manistique, Mich., Director of the Alger-Schoolcraft Health Department, has been appointed to take charge of the new health service in Schoolcraft County, providing medical, nursing, and hospital care for expectant mothers who would not otherwise be able to secure such care. This service has been organized by the Michigan State Department of Health with Social Security Funds, and will be operated with the coöperation of local physicians.

DR. ALEXANDER M. CAMPBELL, of Grand Rapids, Mich., has been appointed full time Consultant to the Bureau of Maternal and Child Health of the Michigan State Department of Health, Lansing. He will carry on a program jointly sponsored by the state medical society, the W. K. Kellogg Foundation, the University of Michigan, and the State Department of Health, working with the maternal health committees of the county medical societies in the state.

DR. CLAUDE DOLLENS, of Oolitic, Ind., has been appointed Health Officer of Lawrence County, succeeding the late DR. JOHN S. WOOLERY, of Bedford.

DR. LOUIS J. FREDERICK has been appointed Health Commissioner of

† Member A.P.H.A.

Joliet, Ill., succeeding the late DR. EDWARD J. HIGGINS.

THOMAS E. GIBSON, M.D.,† of Paw Paw, Mich., formerly Director of the Van Buren County Health Department, has been appointed Director of the Venereal Disease Division of the Michigan State Department of Health, Lansing.

ROBERT B. HARKNESS, M.D.,† of Lansing, Mich., Director of the Barry County Health Department, was elected President of the State Council of Health recently, succeeding the late URA G. RICKERT, D.D.S., of Ann Arbor.

DR. WILLIAM HARRY HUTTO † has been appointed Health Officer of Kokomo, Ind., and Secretary of the City Board of Health, succeeding DR. WILLIAM J. MARTIN.†

DR. THOMAS J. MCKEAN, of Montpelier, Ind., has been named Health Officer of Blackford County, to succeed the late DR. ELMER D. SHADDAY.

ARTHUR W. NEWITT, M.D.,† who has been Chief of the Division of Tuberculosis of the Michigan State Department of Health, Lansing, has been appointed Acting Director of the Division of Epidemiology.

DR. EXIE E. WELSCH, who has been directing the mental hygiene program of the Bureau of Maternal and Child Health of the Indiana State Board of Health, has been transferred to the Bureau of Mental Care of the State Department of Public Welfare. She will assist DR. GEORGE C. STEVENS, Director, Division of Medical Care, in organizing the clinics.

Eastern States

LETHA S. ALLEN, R.N.,† formerly Director of the Public Health Nursing Organization of Eastchester, N. Y., has recently been appointed by the Nursing Bureau of Manhattan and Bronx to develop a placement and vocational guidance service for public health nurses. This Bureau, which has been working in the institutional field since 1933, is now widening its scope, and offering assistance both to public health nurses and the employing agencies in their problems of placement. It has the tentative approval of the National Organization for Public Health Nursing.

MURIEL F. BLISS, C.P.H.,† who has recently completed a course in public health at Yale University, has accepted a position in health education under the Nassau County, N. Y., Cancer Committee, Mineola, Long Island.

DR. SAMUEL J. DICKEY, of West Chester, Pa., Health Officer of Chester County, has been appointed Director of the Division of Tuberculosis in the Pennsylvania State Department of Health.

DR. FRANCIS H. GLAZEBROOK, Medical Director since 1931 of the Medical Department of the New York Stock Exchange, New York, N. Y., has retired. The Department was discontinued as an Exchange activity on April 1.

DR. CHARLES F. GORMLY, of Providence, R. I., has been appointed Chairman of a Committee on Industrial Health of the Rhode Island Medical Society.

SAMUEL MCCLINTOCK HAMILL, M.D.,† of Philadelphia, Pa., was awarded the Dr. I. P. Strittmatter Gold Medal by the Philadelphia County Medical Society on April 12. Dr. Hamill, who has practised in Philadelphia since 1890, has been active in child welfare work for many years.

DR. HAROLD A. HOWARD has been appointed Health Officer of Wethersfield, Conn., to succeed the late DR. EDWARD G. FOX.

DR. ROBERT S. MILLEN, of Westbury,

† Member A.P.H.A.

N. Y., is taking over the quarters of the discontinued Medical Department of the New York Stock Exchange, New York, N. Y., and will operate a clinic there on his own behalf.

WOODBRIDGE E. MORRIS, M.D.,† Dover, Del., has resigned as Director of the Division of Maternal and Child Health and of the Crippled Children's Service of the Delaware State Board of Health as of May 1, to accept the position of Director of the Birth Control Federation of America, with headquarters in New York, N. Y. The Federation was formed in January, 1939, by a merger of the American Birth Control League and the Birth Control Clinical Research Bureau.

DR. CYRUS E. PENDLETON has been appointed Health Officer of Colchester, Conn., to succeed the late EDWARD J. HOWLAND, M.D.†

DR. JOHN M. RENEHAN has been appointed Health Officer of Ansonia, Conn., to succeed DR. LOUIS HOWARD WILMOT.

DR. GEORGE E. ROCH has been appointed Health Officer of Willimantic, Conn., to succeed DR. REUBEN ROTHBLATT.

LESTER A. ROUND, PH.D., has been appointed Director of the Department of Public Health and State Registrar of Vital Statistics for Rhode Island, succeeding EDWARD A. MCLAUGHLIN, M.D.†

Southern States

DR. JOHN B. FLOYD, of Richmond, Ky., has been appointed Director of the newly created Bureau of Medical Service of the Kentucky State Department of Health, established to assist the medical profession of the state in providing medical service for the indigent and medically indigent.

DR. JOHN M. HOOPER, of Floydada, Tex., formerly of Pampa, has been appointed Director of Public Health for District No. 1, which includes 60 counties in the Panhandle and South Plains area.

DR. FRANCIS T. ISBELL, of Eastland, Tex., has been appointed Health Officer of Eastland County.

DR. ALBERT G. LEROY, of Atlanta, Ga., has been appointed Commissioner of Health of Toombs County.

COLONEL JAMES CARRE MAGEE, Medical Corps, U. S. Army, at present Executive Officer of the Walter Reed General Hospital, Washington, D. C., has been appointed Surgeon General of the U. S. Army with the rank of Major General. He succeeds MAJOR GENERAL CHARLES R. REYNOLDS, whose term as Surgeon General expired May 31. Colonel Magee is a veteran of 32 years' service in the Medical Corps; and is a World War veteran, having served in the A.E.F. during the entire period of American participation in the war.

Western States

DR. JAMES V. FOLEY has been appointed Health Officer of Bannock County, Ida., succeeding GEORGE H. BISCHOFF, M.D.†

HOWARD L. MCMARTIN, M.D.,† of Boise, Ida., formerly Director of the Division of Maternal and Child Health and Crippled Children, of the Idaho State Department of Public Welfare, has been appointed Director of the Division of Public Health of the Department.

DR. JOSEPH L. RICHARDS, of Polson, Mont., has been reappointed County Physician and Secretary of the Board of Health of Lake County.

COURTNEY M. SMITH, M.D.,† of Oregon City, Ore., has resigned as Health Officer of Clackamas County, to become Assistant Health Officer of Portland.

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† Member A.P.H.A.

CONFERENCES AND DATES

American Association for the Advancement of Science. Summer Meeting, Section on Medical Sciences, held in collaboration with the American Neisserian Medical Society—Milwaukee, Wis., July 19–24. Annual Meeting—Columbus, Ohio, December 27, 1939–January 2, 1940.

American Association of Industrial Physicians and Surgeons—24th Annual Meeting. With the American Conference on Occupational Diseases and Industrial Hygiene. Hotel Statler, Cleveland, Ohio. June 5–8.

American Congress of Physical Therapy. Hotel Pennsylvania, New York, N. Y. September 5–8. (Following Seminar in Physical Therapy for Physicians and Technicians, August 30–September 2.)

American Congress on Obstetrics and Gynecology—sponsored by the American Committee on Maternal Welfare, Inc. Municipal Auditorium, Cleveland, Ohio. September 11–15.

American Dietetic Association—22nd Annual Meeting. Hotel Ambassador, Los Angeles, Calif. August 27–31.

American Home Economics Association—32nd Annual Meeting, Gunter Hotel, San Antonio, Tex. June 20–23.

American Library Association. Exposition Auditorium, San Francisco, Calif. June 18–24.

American Neisserian Medical Society. Milwaukee, Wis. June 20–22.

American Public Health Association. 68th Annual Meeting. Hotel William Penn, Pittsburgh, Pa. October 17–20.

American Public Welfare Association, Buffalo, N. Y. June 20–22.

American Society of Civil Engineers—Summer: San Francisco, Calif., July 26–29. Fall: New York, N. Y., September 4–9.

American Society of Heating and Ventilating Engineers. Semi-Annual Meeting 1939 (Great Lakes Summer Meeting). Grand Hotel, Mackinac Island, Mich. July 4–6.

American Water Works Association—59th Annual Meeting. Ambassador Hotel, Chelsea Hotel, Atlantic City, N. J. June 11–15.

Civil Service Assembly—Eastern Regional Conference. Asbury Park, N. J. June 14–17.

Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C., May 14, 1940.

Educational Frontiers, Conference on. School of Education Building, Stanford University, Calif. July 7–9.

Food Technology Conference. Under auspices of the Division of Food Technology and Industrial Biology, of the Massachusetts Institute of Technology. Cambridge, Mass. June 28–July 1.

Health Officers and Public Health Nurses—Annual Conference, under auspices of New York State Department of Health. Grand Union Hotel, Saratoga Springs, N. Y. June 27–29.

Medical Library Association. Hotel Douglas, Newark, N. J. June 27–29.

Michigan Public Health Association. Lansing, Mich. November 1–3.

National Conference of Social Work. Buffalo, N. Y. June 18–24.

National County Officers' Association. Ogden, Utah. July 17–19.

National Education Association, and affiliated organizations. San Francisco, Calif. July 2–6.

National Gastroenterological Association. New York, N. Y. June 1–2.

National Institute for Traffic Safety Training (Second). University of Michigan, Ann Arbor, Mich. August 14–26.

National Recreation Congress — 24th. Boston, Mass. October 9–13.

National Tuberculosis Association. Hotel Statler, Boston, Mass. June 26–29.

Pacific Science Congress—Sixth. Under the auspices of the National Research Council. Oakland, Calif. July 24–August 12.

Pan-Pacific Surgical Association—Third Congress. Honolulu, T.H. September 15–28.

Pennsylvania Sewage Works Association—13th Annual Conference. State College, Pa. June 26–28.

Smoke Prevention Association. Milwaukee, Wis. June 13–16.

Southern California Public Health Association. Long Beach, Calif. January 24, 1940.

Symposium on Virus and Rickettsial Diseases—short course of lectures, clinics, and demonstrations, with special emphasis on public health significance. Harvard School of Public Health, Boston, Mass. June 12–17.

Texas Public Health Association. Galveston, Tex. October 2–4.

West Virginia Public Health Association. Hotel Fairmont, Fairmont, W. Va. November 8–10.

Western Branch, A.P.H.A. Tenth Annual Meeting. Hotel Oakland, Oakland, Calif. July 23–28.

Canada

Canadian Public Health Association—28th Annual Meeting. In conjunction with the 25th Annual Conference of the Ontario Health Officers Association. Royal York Hotel, Toronto, Ont. June 12–14.

International Hospital Association. Toronto, Ont. September 19–23.

American College of Hospital Administrators. Toronto, Ont. September 24–25.

American Hospital Association. Toronto, Ont. September 25–29.

FOREIGN

Fifth National Medical Congress of Uruguay. Montevideo, Uruguay. Summer of 1939.

Royal Sanitary Institute of Great Britain. Scarborough, England. July 3–8.

International Federation for Housing and Town Planning. Stockholm, Sweden, July 5–13.

Summer Course of Phthisiology. Under direction of Professor Eugenio Morelli. Carlo Forlanini Institute, Rome, Italy. July 15–October 15.

International Malaria Course for 1939. Under direction of Professor Giuseppe Bastianelli. Ettore Marchiafava Institute of Malariology, Rome, Italy. July 24–September 20.

Fifth International Congress on Life-Saving and First-Aid to the Injured. Zurich, and St. Moritz, Switzerland. July 23–28.

World Federation of Education Associations, Eighth Biennial Congress. Rio de Janeiro, Brazil. August 6–11. (SS. Rotterdam Summer Cruise to South America: from New York, July 5; from New Orleans, July 10; returning to New York August 27.)

International Congress of Public Health and Public Safety. Liege, Belgium. August 12–15.

Third International Neurological Congress. Copenhagen, Denmark. August 21–25.

International Congress on Public Cleansing. Vienna, Austria. August 24–28.

Eighth Pan American Child Congress. San Jose, Costa Rico. August 28–September 4.

International Conference on Sewage Works and Disposal. Glasgow, Scotland. September 12–18.

Intergovernmental Conference of American Countries on Rural Hygiene. Mexico City, Mexico. End of 1939 (postponed from November, 1938).